Spotter Concepts

Basic Class

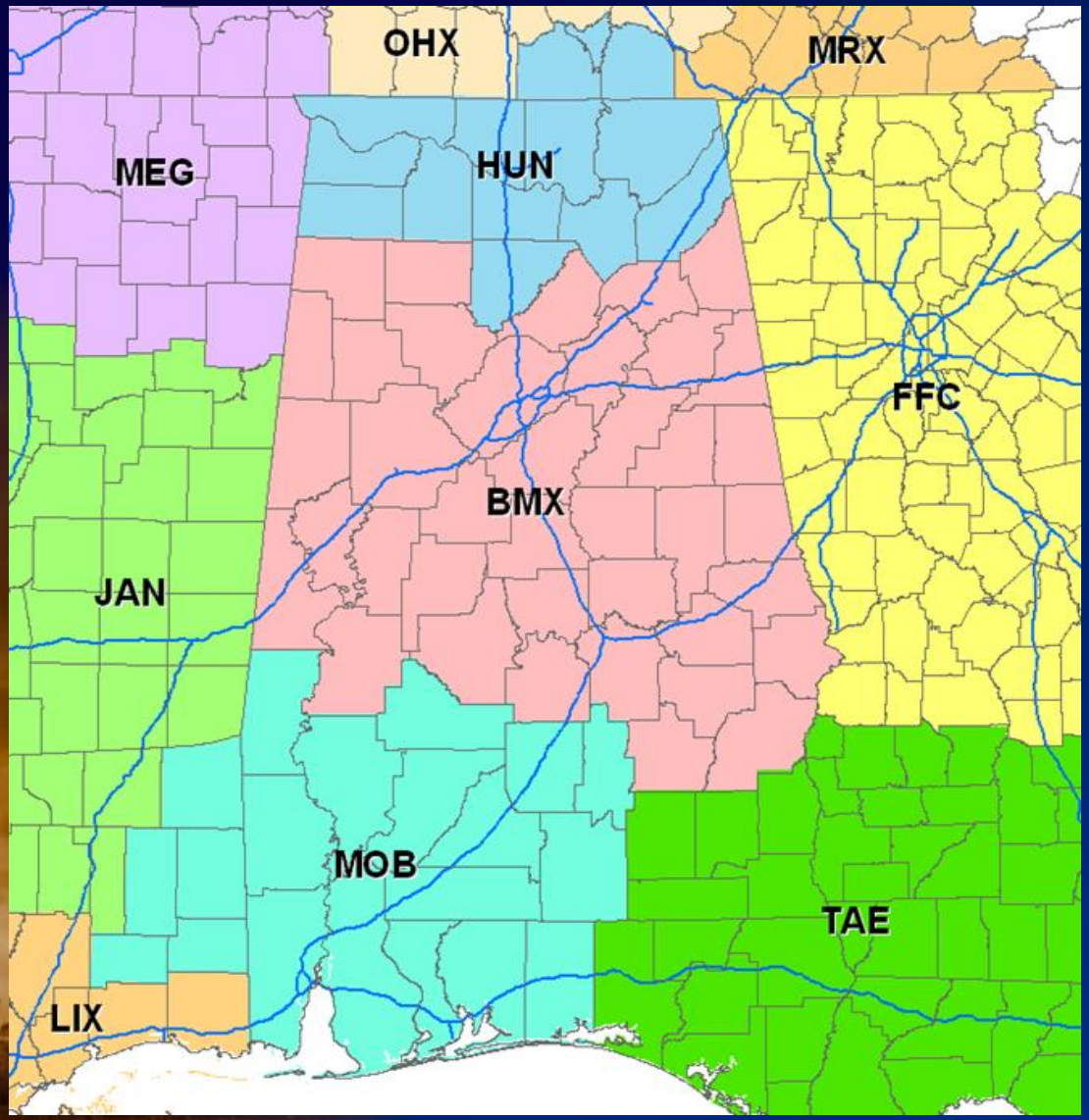
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service – Birmingham, AL

Why are we here?

PROTECT LIFE AND PROPERTY

helping *you* make informed decisions

Your National Weather Service Birmingham, AL



- Responsible for 39 of 67 Alabama counties across North and Central Alabama
  - That translates into 25,000 square miles
- Approximately 2.67 million citizens

Disclaimer

This is ***NOT*** storm **CHASER** training!

The National Weather Service encourages everyone, at ***ALL*** times, to

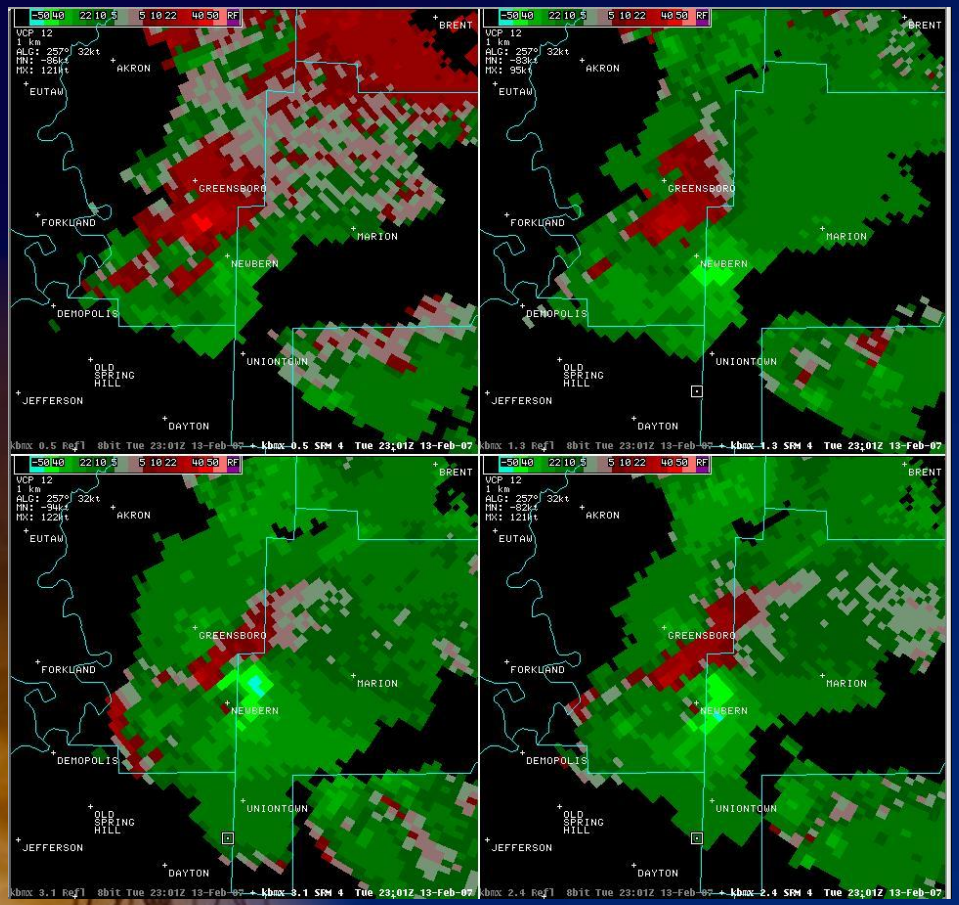
SEEK SHELTER

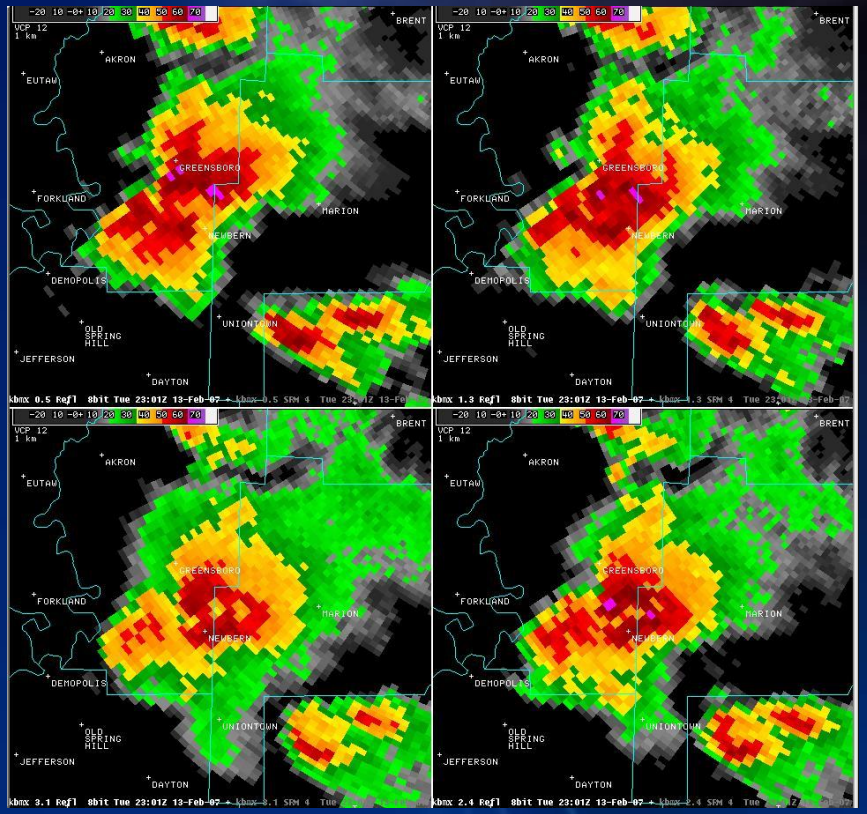
when threatened by hazardous weather!

Why we need spotters

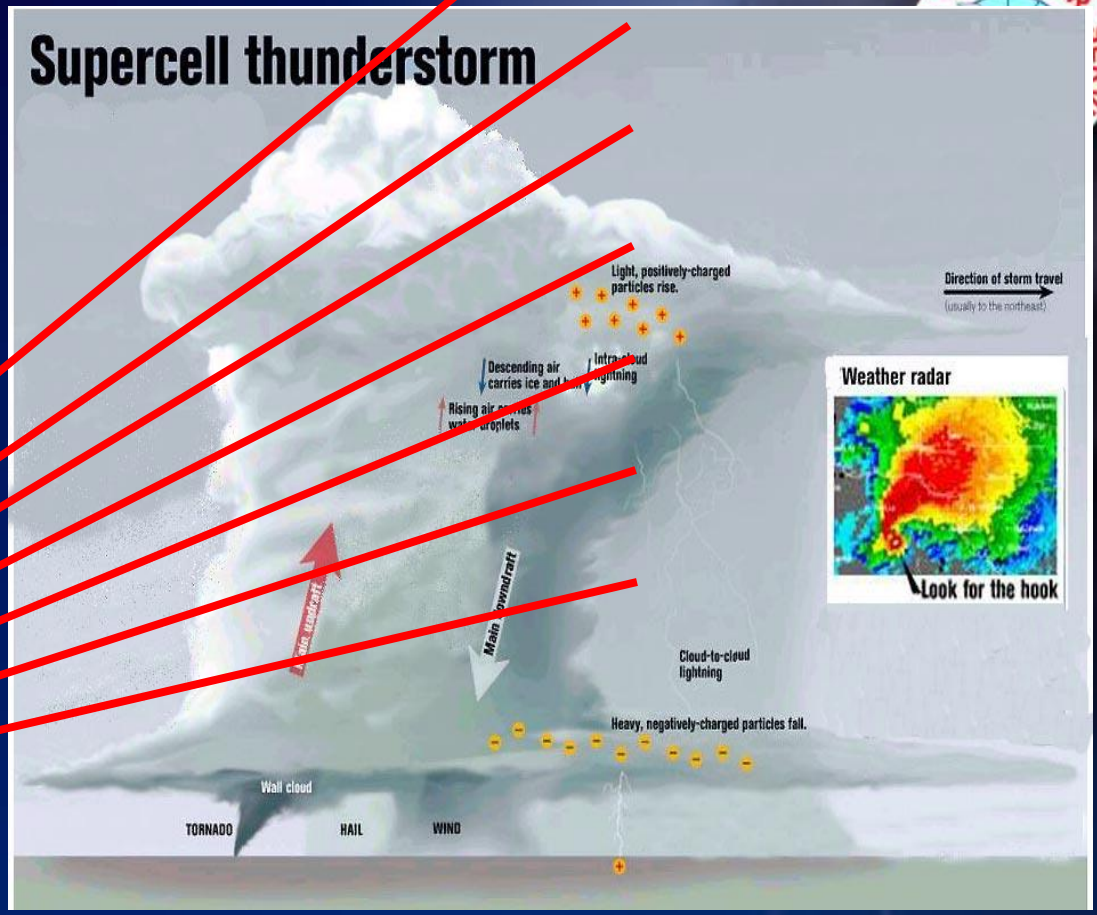
- **GROUND TRUTH!**
- ***Radar limitations*** **(beam height & resolution…effective resolution decreases with distance...radars do not see tornadoes)**
- **Very high percent of *weak tornadoes* (radar signatures less defined)**
- ***Real-time verification* improves warning accuracy**
- **Reports add credibility, enhances public response**

Why Are Storm Spotters Important?





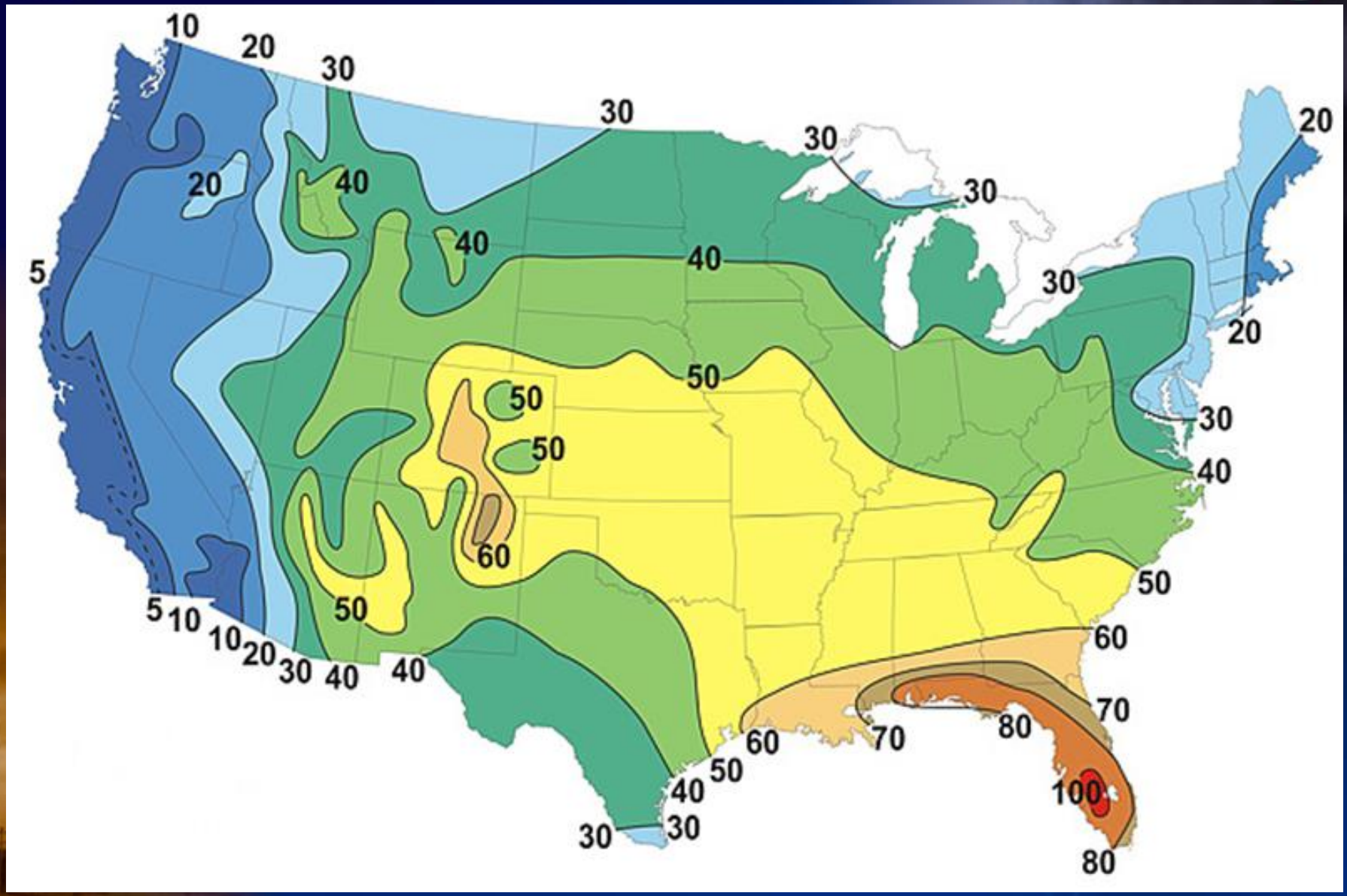
Doppler radar imagery from Newbern Tornado, February 13, 2007



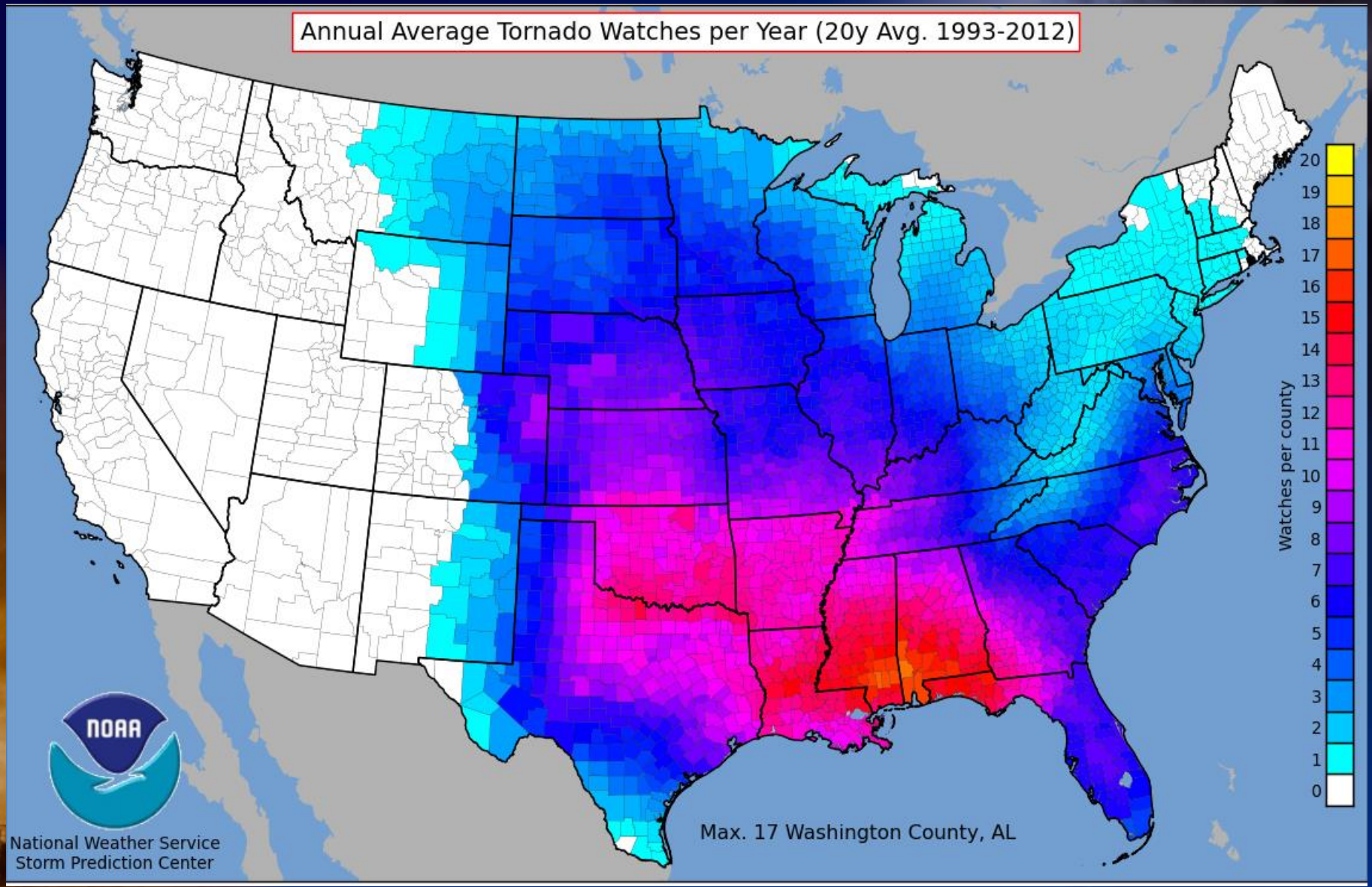
RDA

STORMS ARE *3-DIMENSIONAL*

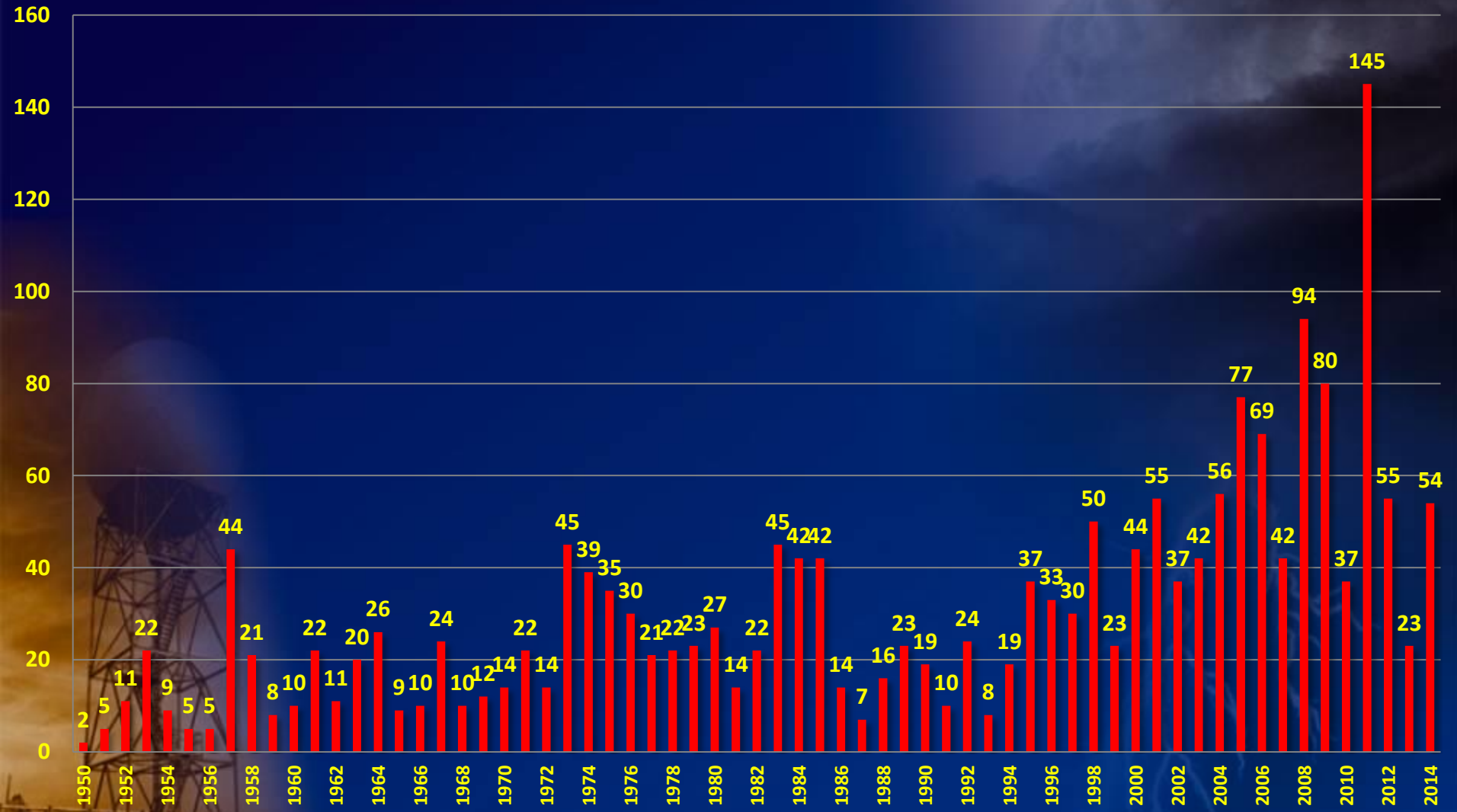
Thunderstorm Climatology



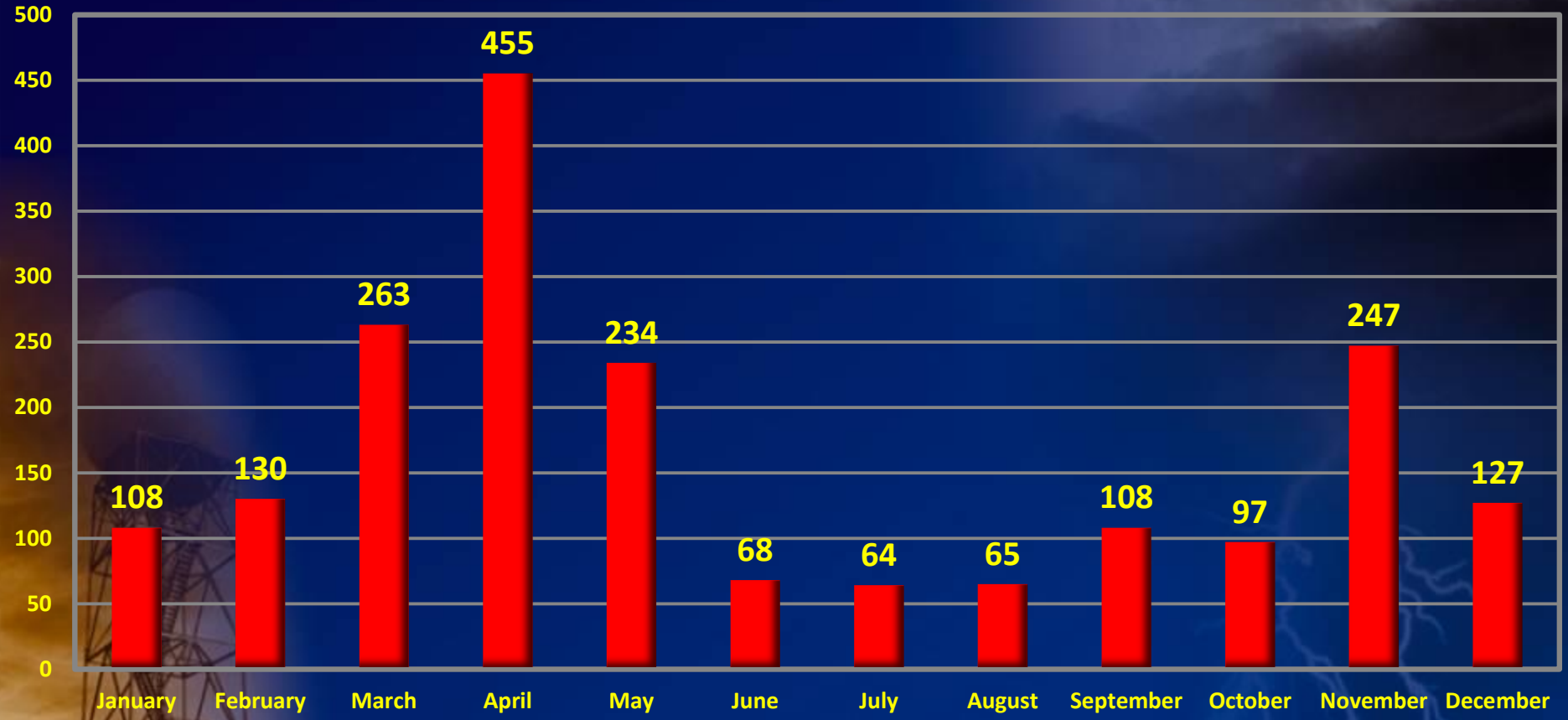
Tornado Alley ?



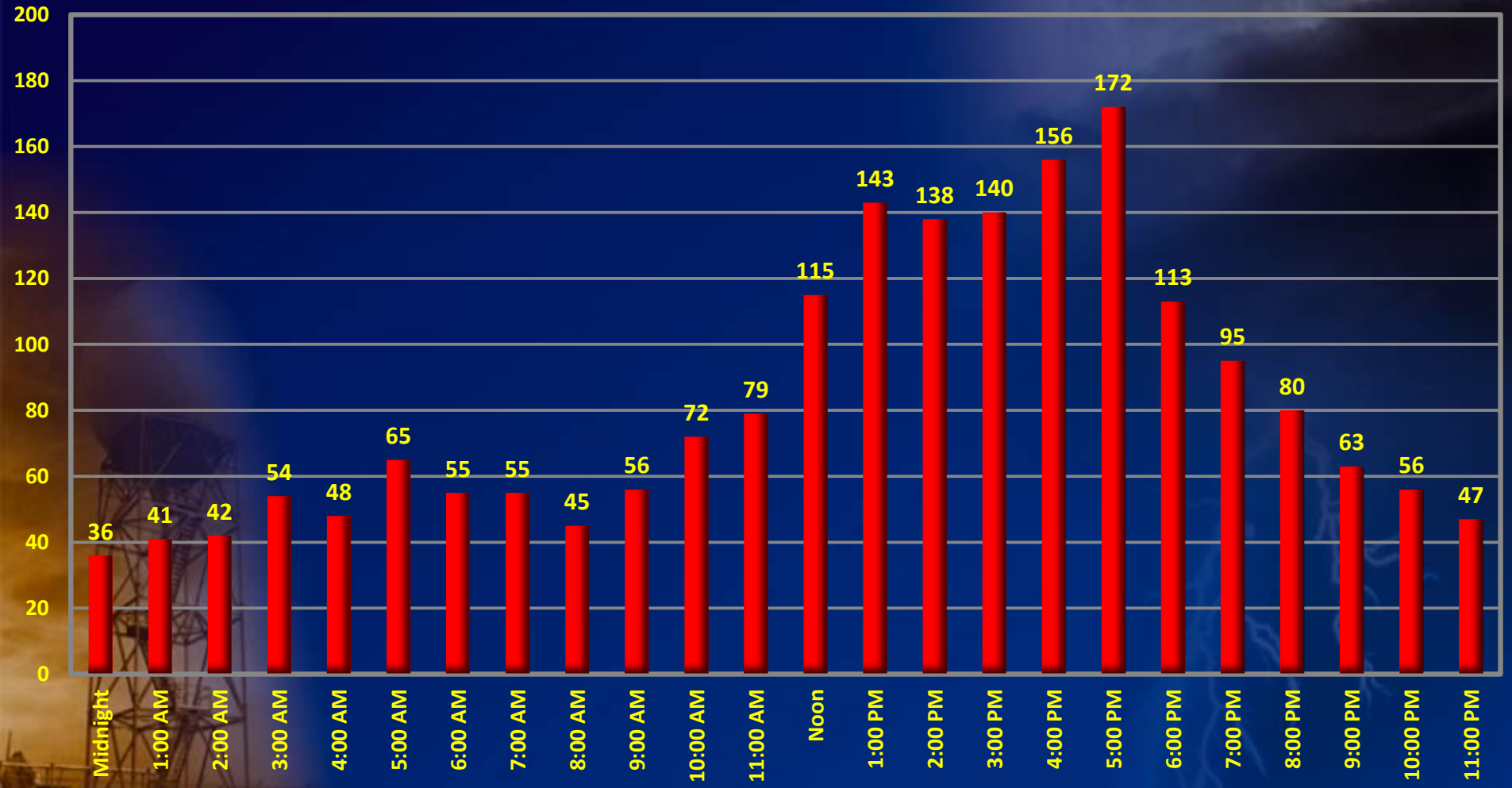
Alabama Tornadoes by Year
1950-2014

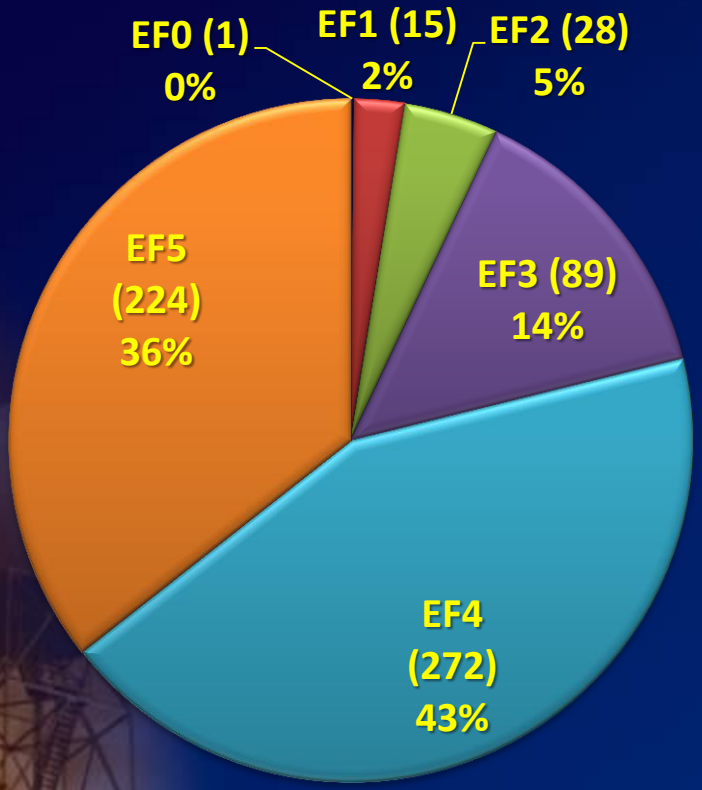


Alabama Tornadoes by Month
1950-2014

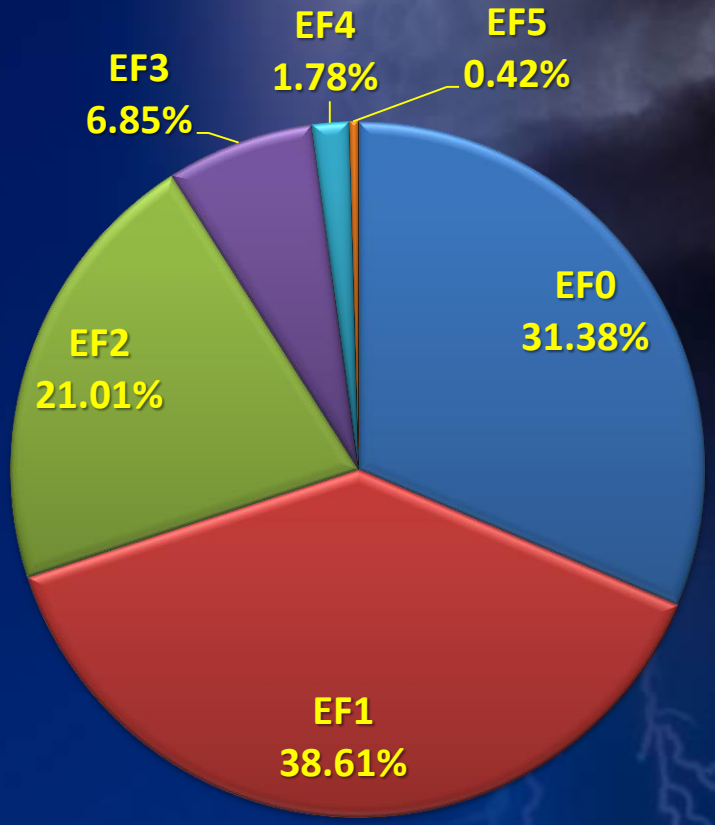


Alabama Torndoes by Hour
1950-2014



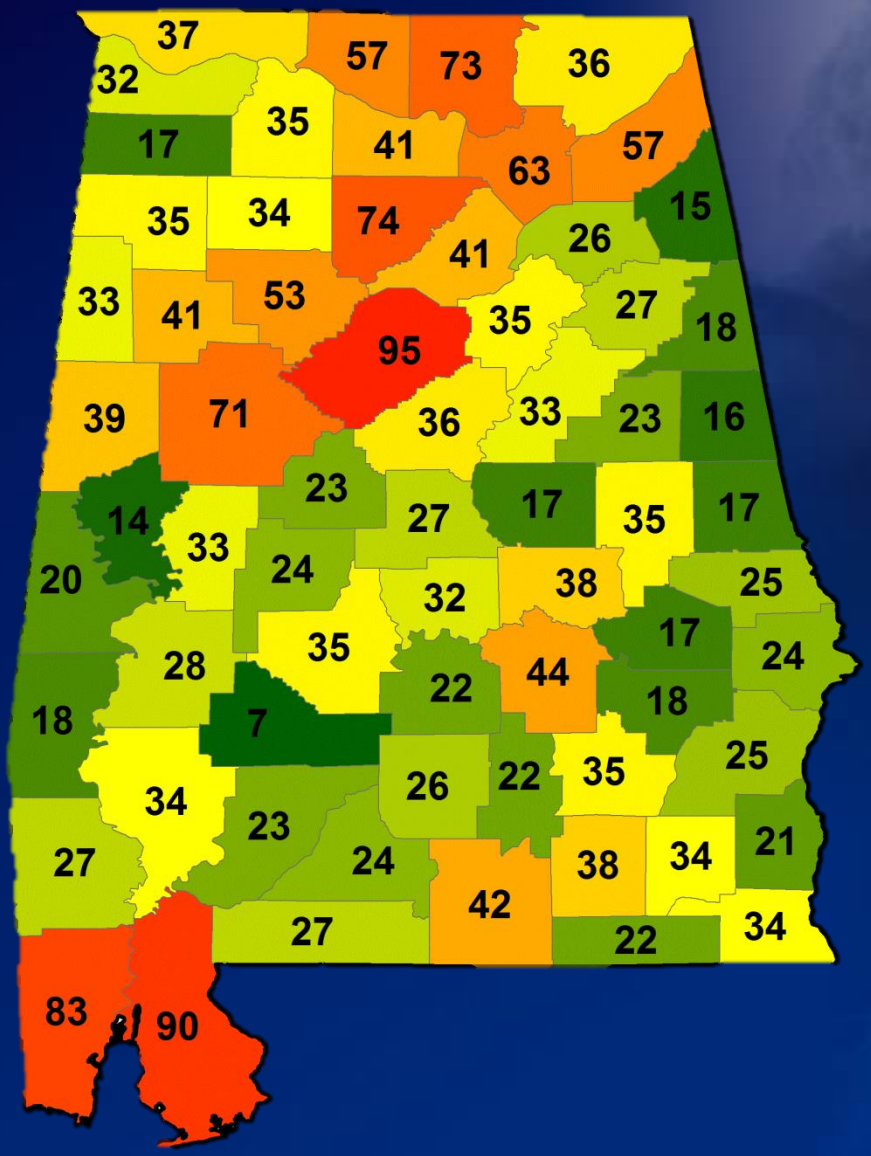


Fatalities by EF-Scale
1950-2014



Tornadoes by EF-Scale
1950-2014

Tornadoes by County 1950-2014



Spotter Principles

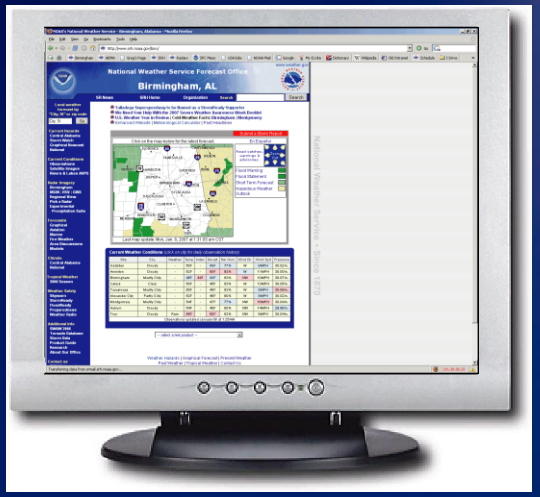
- Personal safety is the primary objective of every spotter.
- Adhere to the concept of ACES at all times.
- Obey federal, state, and local laws and directives from public safety officials.
- Never put yourself in harm's way.

ACES

- **Awareness**
- **Communication**
- **Escape Route**
- **Shelter**

How to Get Weather Information

NOAA WEATHER RADIO S.A.M.E.



COMPUTER

BATTERY/CRANK RADIO

TELEVISION

CAR RADIO

CELL PHONE

TELEVISION

How to Get Weather Information

Text Alerts and Apps

No endorsement implied

NOAA Weather Radio

- 20 Transmitters across Alabama
- NOAA Weather Radio is the fastest way to get our warnings!!!

National Weather Service Weather Forecast Office

Birmingham, AL

weather.gov

Home | Site Map | News | Organization | Search for: | NWS | All NOAA | Go

Local forecast by "City, St" or Zip Code

City, St | Go

XML RSS Feeds

Current Hazards
- Local
- Nationwide
- Outlooks
- Submit Storm Reports

Forecasts
- Local
- Forecast Discussion
- Activity Planner
- Graphical
- Tropical Weather
- Fire Weather
- Aviation Weather
- Air Quality Forecast
- BUFKIT
- Multimedia Briefing

Current Weather
- Observations
- Satellite Images
- Rivers/Lakes
- Daily Rainfall Plots

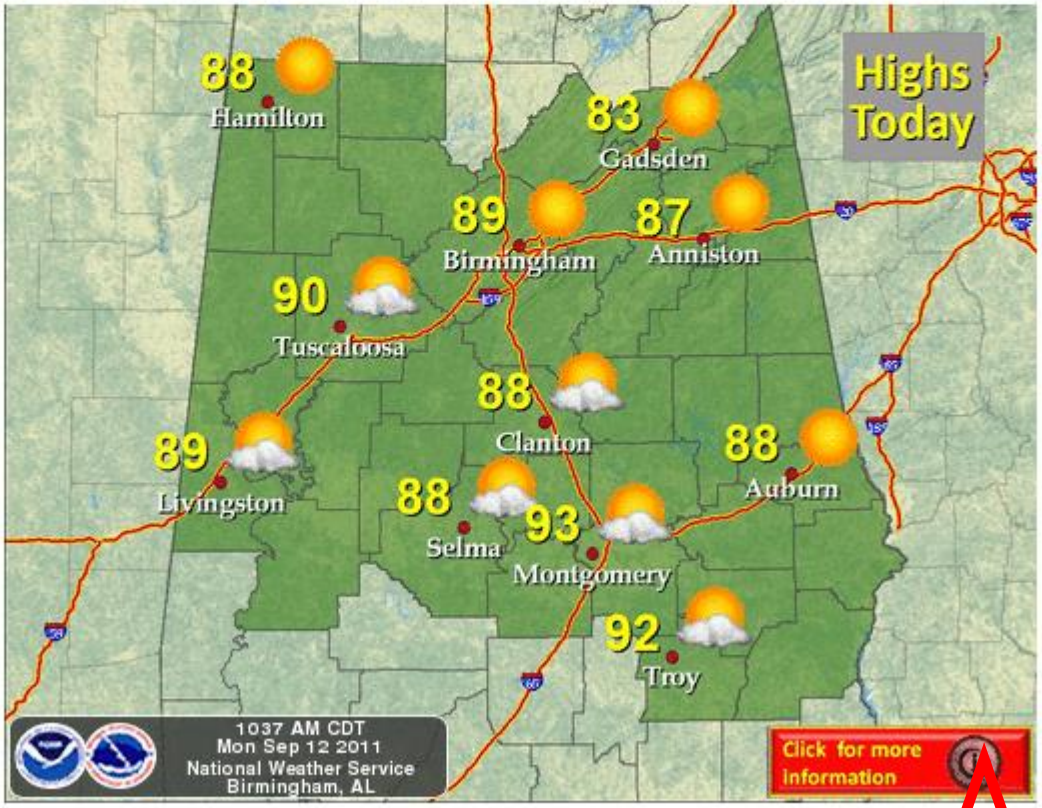
Radar Imagery
- Nationwide
- Birmingham
- East Alabama
- Regional Loop

Climate
- Local
- National
- More...
- Drought Statement

Top News of the Day

- Look for an Upcoming Storm Spotter Class Near You!
- Interested in Improving the Warning Process? Click HERE
- Being Prepared for the Worst in a Time of Disaster - Part 3
- Get Involved at the National Weather Association Annual Conference

Today | Tonight



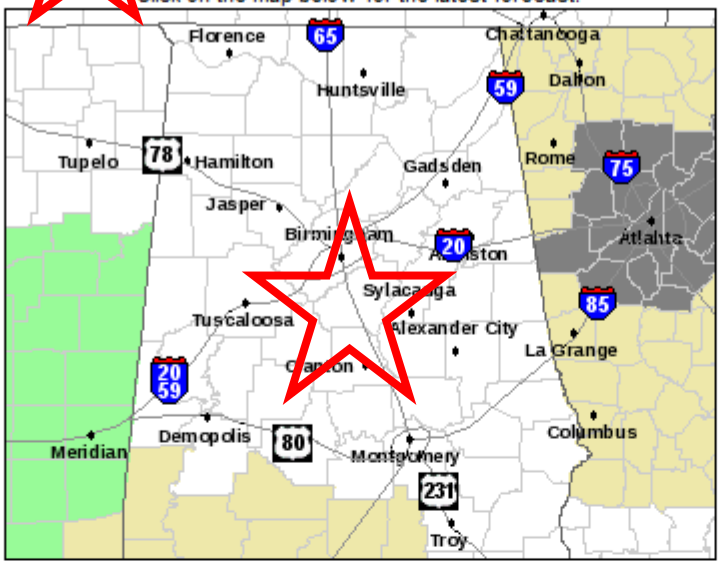
Watches & Warnings | Observations | Forecast Graphics | Rivers & Lakes | Climate | Multimedia Briefing

*Graphicasts

*Hazardous Weather Outlook

*Multimedia Briefings

Click on the map below for the latest forecast.



Last map update: Mon, Sep. 12, 2011 at 12:06:15 pm CDT

Read watches, warnings & advisories

Zoom Out

Air Quality Alert

Hazardous Weather Outlook

Short Term Forecast

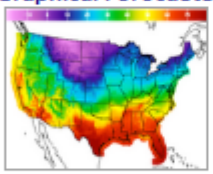
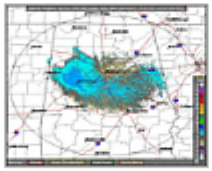
Latest Conditions in Birmingham, AL — **Choose Your Front Page City**

Sep 12
11:53 am

A Few Clouds

83°F
(28°C)

Select A City:

Graphical Forecasts	Radar	Satellite	Weather Map
			

LOCATION	TIME[cdt]	WEATHER	TEMP	DEWPT	RH %	WIND mph	PRESSURE	SUNRISE/SUNSET
Alex City	11:55 AM	Partly Cloudy	81°F	59°F	48%	NW 8	30.14 in	6:25 AM/6:56 PM
Anniston	11:53 AM	Partly Cloudy	82°F	64°F	55%	W 7	30.13 in	6:24 AM/6:56 PM
Auburn	11:55 AM	Fair	82°F	63°F	51%	N 7	30.12 in	6:23 AM/6:54 PM
Birmingham	11:53 AM	A Few Clouds	83°F	62°F	49%	W 7	30.15 in	6:28 AM/6:59 PM
Calera	11:53 AM	Fair	83°F	62°F	49%	W 9	30.14 in	6:28 AM/6:59 PM
Montgomery	11:53 AM	A Few Clouds	88°F	64°F	45%	NW 7	30.12 in	6:27 AM/6:57 PM
Troy	11:53 AM	Fair	85°F	63°F	48%	NW 10	30.14 in	6:25 AM/6:55 PM

Point Specific Information

***Watches & Warnings**

***** Point-n-click Forecast**

Important Definitions

HAZARDOUS WEATHER OUTLOOK

- Anticipated Hazardous Weather over next 7 days
- Issued 3-4 times per day

TORNADO / SEVERE THUNDERSTORM WATCH

- Conditional are favorable for severe thunderstorms / tornadoes
- Issued by SPC, last 3 to 6 hours

TORNADO / SEVERE THUNDERSTORM WARNING

- Conditions are occurring or about to occur
- Issued by local NWS office, last 30-60 minutes

WATCH THE SKY!

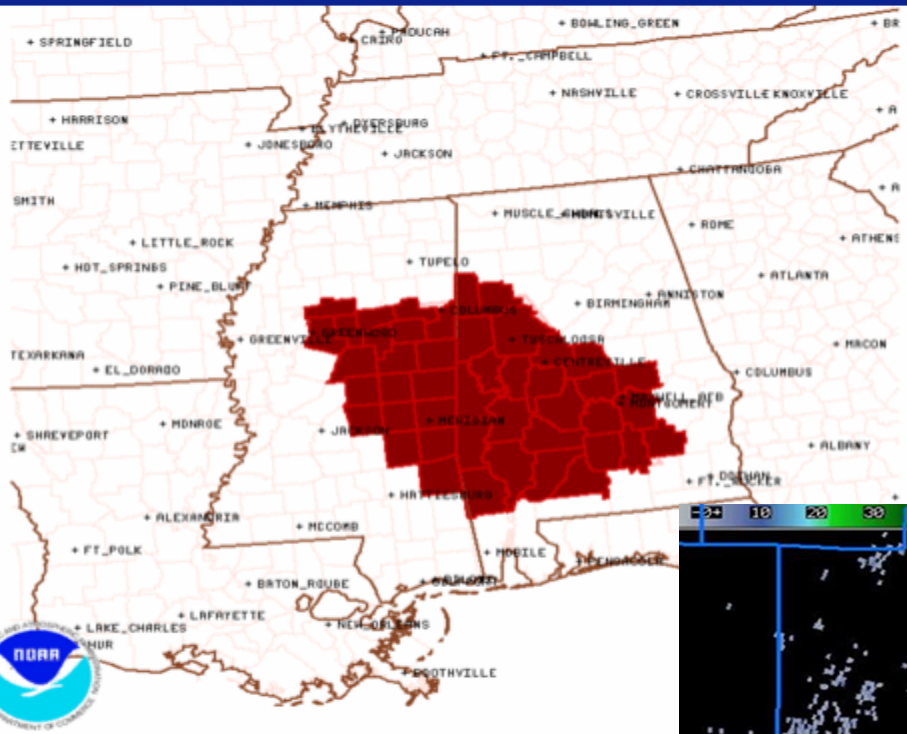
TAKE ACTION!!!

Watch vs. Warning

Tornado Watch 612

< Previous WW Next WW >

Public (Test) | Counties | Probabilities | Aviation | Warnings | Initial RADAR | Related MD



Tornado Watch # 612 - Valid from 350 PM until 1

NOAA/NWS/Storm Prediction Center

Hazard	Tornadoes	EF2+ Tornadoes	Severe Wind	65 kt+ Win
Likelihood	Moderate	Low	Moderate	Low

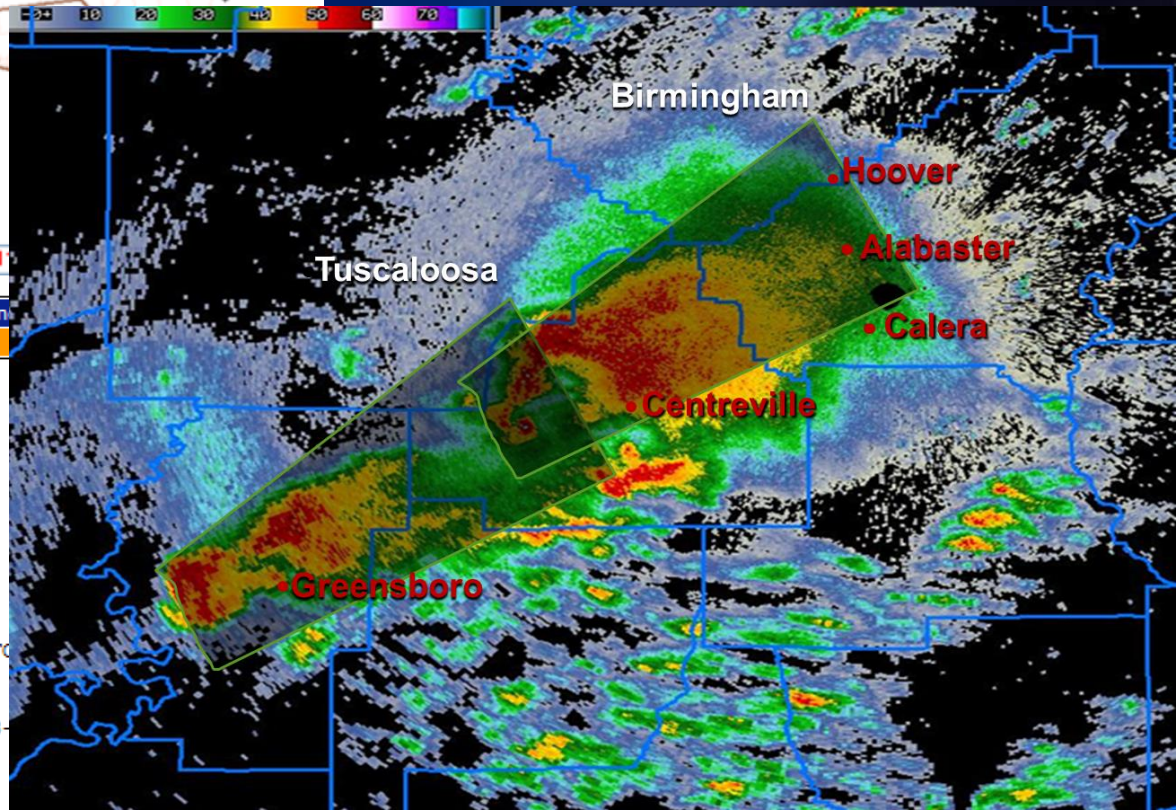
Note: Click for Watch Status Reports.

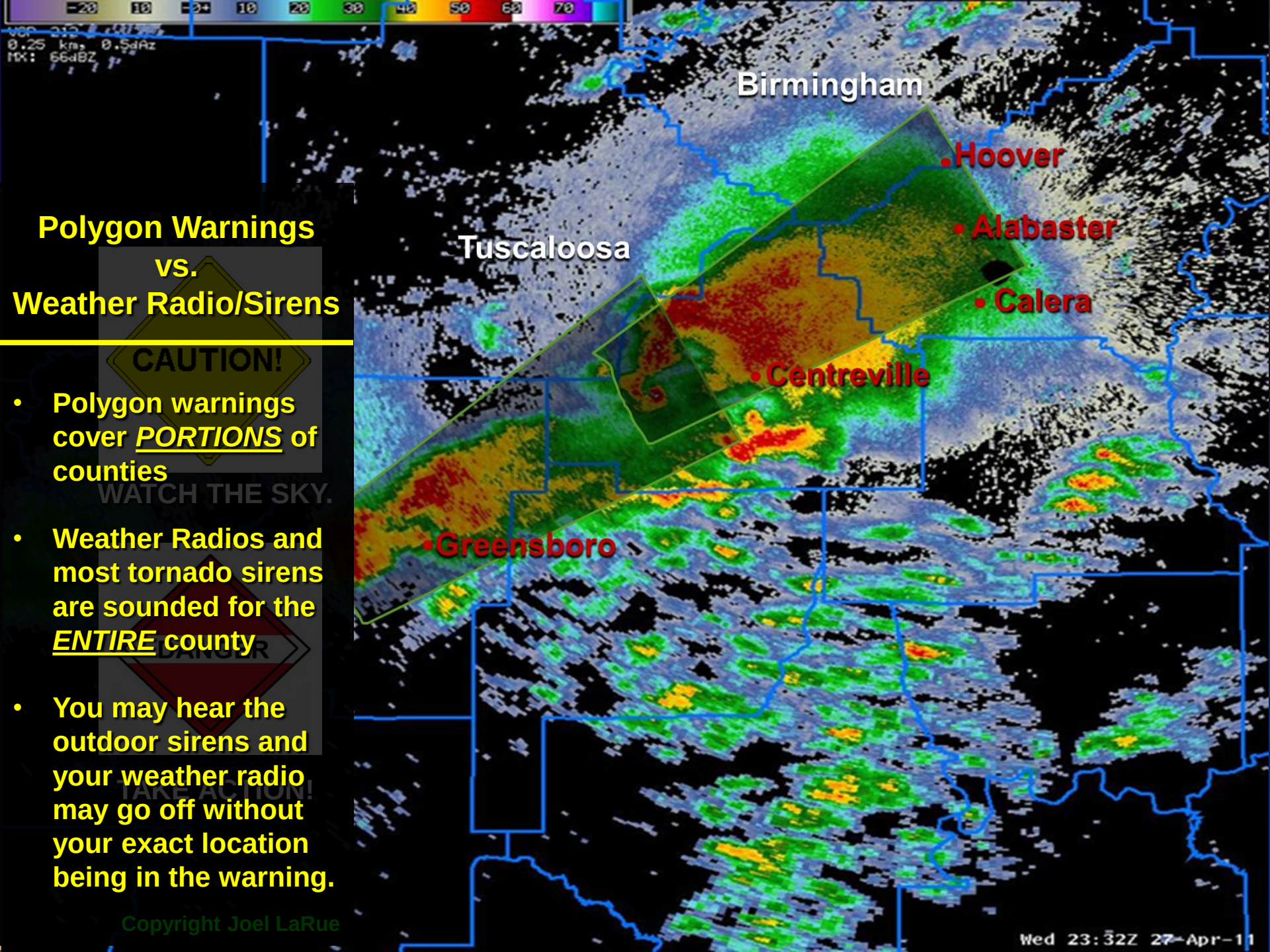
```
WOUS64 KWNS 032044
WOU2

BULLETIN - IMMEDIATE BROADCAST REQUESTED
TORNADO WATCH OUTLINE UPDATE FOR WT 612
NWS STORM PREDICTION CENTER NORMAN OK
350 PM CDT MON SEP 3 2012

TORNADO WATCH 612 IS IN EFFECT UNTIL 1100 PM CDT FO
 FOLLOWING LOCATIONS

ALC001-007-013-021-023-025-035-041-047-051-057-063-
091-099-101-105-107-109-119-125-129-131-040400-
/O.NEW.KWNS.TO.A.0612.120903T2050Z-120904T0400Z/
```





Polygon Warnings vs. Weather Radio/Sirens

- Polygon warnings cover ***PORTIONS*** of counties
- Weather Radios and most tornado sirens are sounded for the ***ENTIRE*** county
- You may hear the outdoor sirens and your weather radio may go off without your exact location being in the warning.

ACES

- Awareness
- **Communication**
- Escape Route
- Shelter

What To Report

Strong Winds or Wind Damage

Estimating Wind Speed

25-31 mph - large branches in motion

32-38 mph – whole trees in motion

39-54 mph – twigs break off, wind impedes walking

55-72 mph – damage to chimneys and TV antennas, large branches broken and some trees uprooted

73-112 mph – removes shingles, windows broken, trailer houses overturned, trees uprooted

113+ mph – roofs torn off, weak buildings and trailer houses destroyed, large trees uprooted

Estimating Wind Speed

THE "SET" EFFECT.....

During a severe weather event, Stress, Excitement, and Tension levels are running high

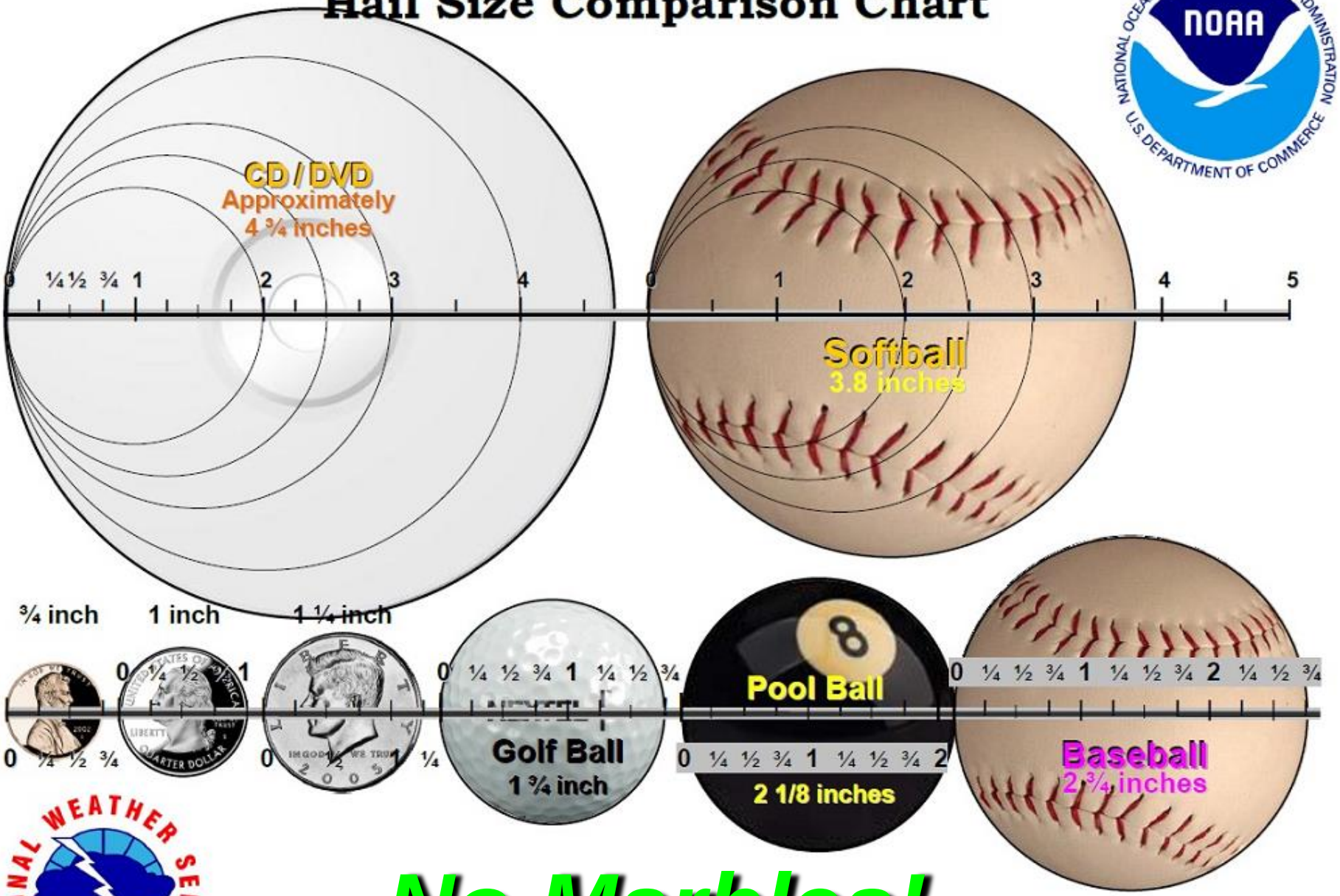
The "SET" effect can alter your logic and reasoning abilities leading to exaggerated reports

A wind gust of 40 MPH during a fair weather day will not cause any great concern, but this same wind speed when experienced during a thunderstorm may seem like 60 MPH gust because of the SET effect.

When in doubt about your estimate, re-think it and try to remain calm and objective as possible. Use the table in the previous slide as a guide for accuracy, speed, and professionalism.

What To Report

Hail Size Comparison Chart



No Marbles!

Produced by Michael S. Lewis, NOAA, National Weather Service, Northern Indiana

What To Report

Tornado, Funnel Cloud, or Wall Cloud

What To Report

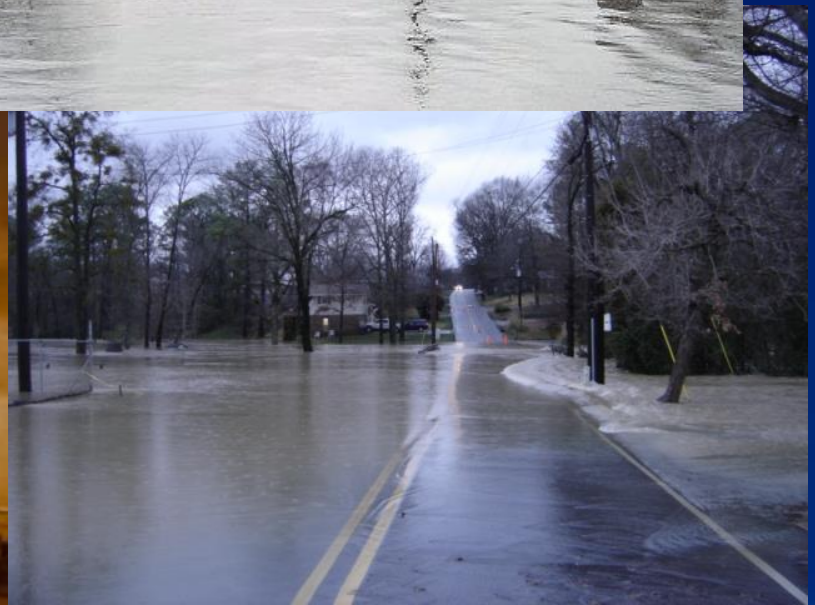
Flash Flooding

- A rapid rise out of banks flow in a river or stream that is a threat to life or property
- Approximately six inches or more of flowing water over a road or bridge and poses a threat to life or property
- Any amount of water in contact with, flowing into, or causing damage to an above ground building (does not include water seepage into basements)
- Three feet or more of ponded water that poses a threat to life or property

The above must occur within six hours of the causative event such as heavy rain, a dam break, or ice jam release

What To Report

Rural Flooding



What To Report

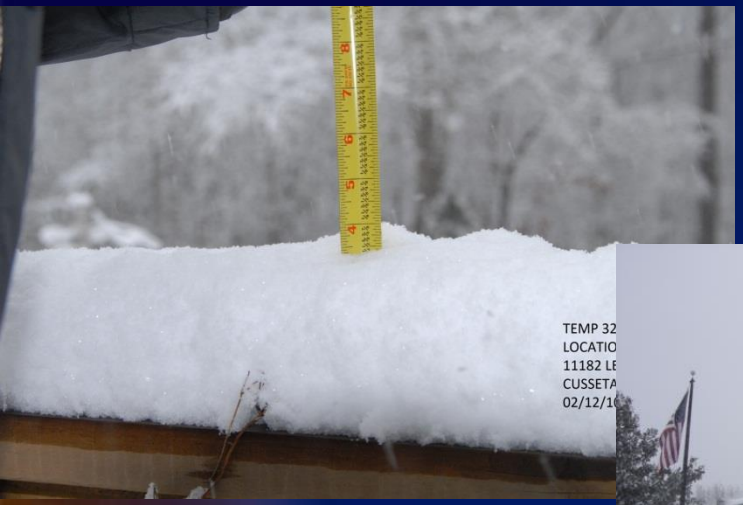
Urban Flooding

What To Report

Heavy Rain or High Water

What To Report

Snow or Ice Accumulation



Your storm report can be sent to the NWS via the Internet.

Local forecast by "City, St" or Zip Code
City, St Go

XML RSS Feeds
Current Hazards
Local
Nationwide
Outlooks
Submit Storm Reports
Forecasts
Local
Forecast Discussion
Activity Planner
Graphical
Tropical Weather
Fire Weather
Aviation Weather
Air Quality Forecast
Current Weather
Observations
Satellite Images
Rivers/Lakes
Radar Imagery
Nationwide
Birmingham
East Alabama
Regional Loop
Climate
Local
National
More...
Daily Rainfall Plots
Weather Safety
Get Prepared
Weather Radio
SKYWARN

Submit a Storm Report

This interface is intended to be used solely for the relay of storm information to the NWS. Other comments or information should be sent to the National Weather Service Birmingham, Alabama.

Event Location

Enter date/time/location of event. Please reference to major roadway or intersection for events within towns/cities.

Event Time:	11 00 AM	Central
Event Date:	Dec 17 2009	
County:	-- Select a County --	
Location *(7 NW Mytown)*:		

Event Type (Select all that apply)

Click box next to events you observed. Next, select appropriate sub-descriptor in pull down menus to describe event.

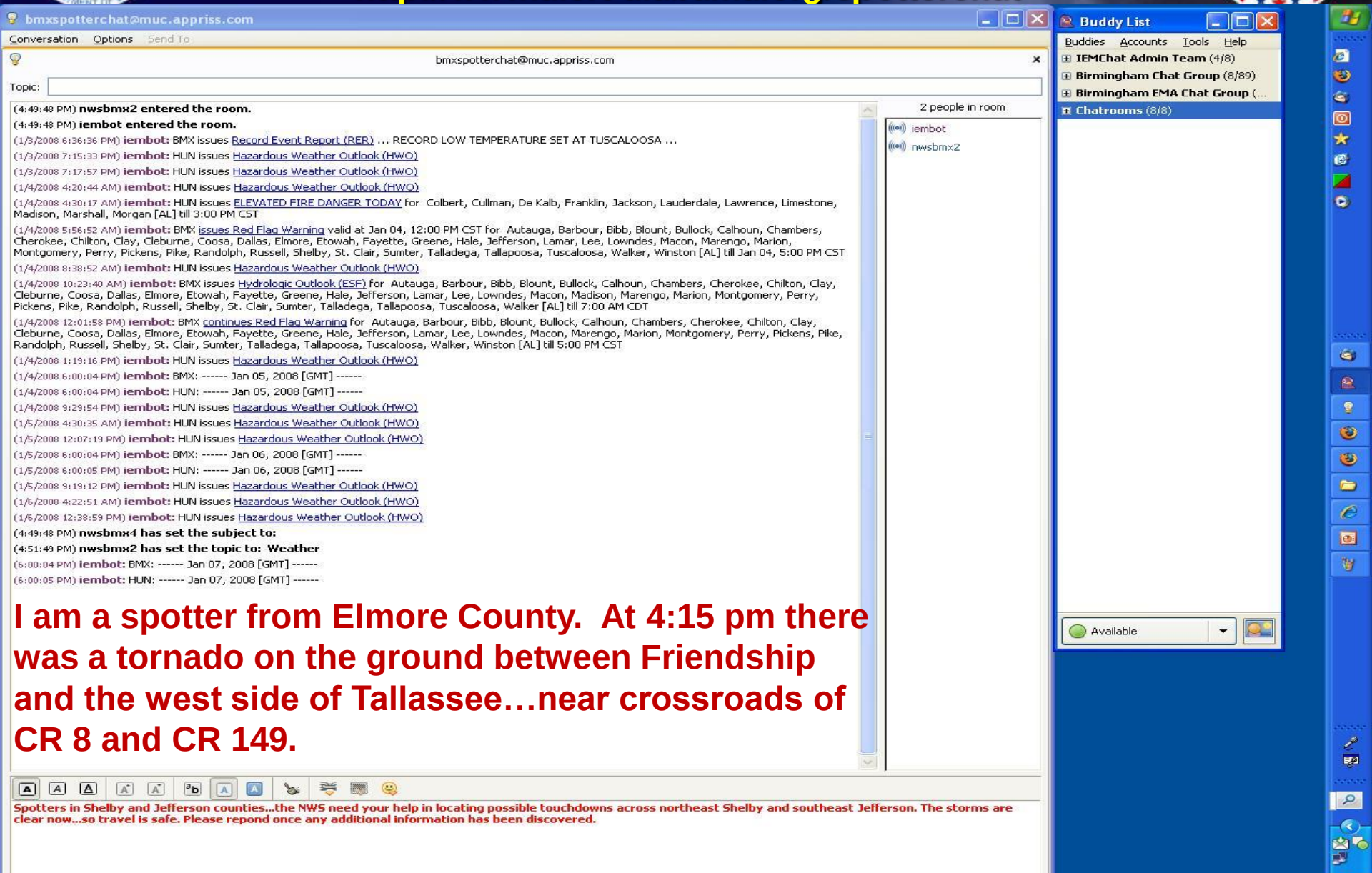
☐ Flood	--Select a flooding category--	
☐ Hail	--Select a Hail size--	
☐ High Wind Speed	--Select a Wind speed--	
☐ Tornado/Funnel Cloud	--Select a report--	
☐ Wind Damage	--Select a Wind Damage Descr	
☐ Snow	--Select a snow total--	--Select a duration--
☐ Freezing Rain/Icing	--Select an ice total--	--Select a duration--
☐ Heavy Rain	--Select a rainfall total--	--Select a duration--

Additional Details

Provide any additional information that you feel is pertinent to your submission (500 characters maximum).

BMX SPOTTER CHAT

Secure, internet-based chat, monitored by ALERT
http://www.alert-alabama.org/spotterchat

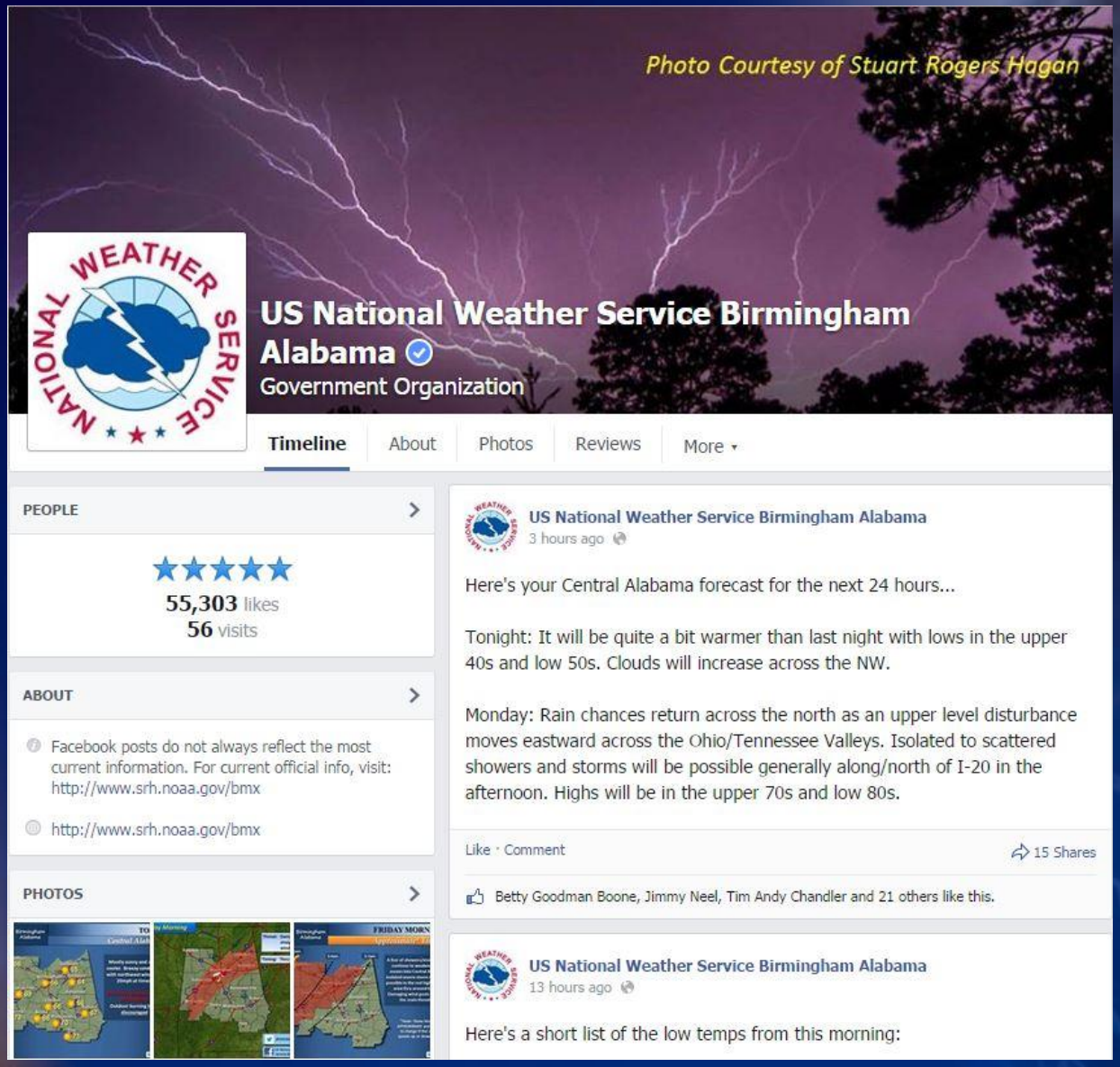


How to Report

- Storm Spotter Line: **1-800-856-0758**
- Your local Emergency Management Office
- Amateur radio
  - Skywarn Net – **K4NWS**
- BMX Spotter Chat
- Call local law enforcement / 911 service
- Social Media: Facebook/Twitter 

*** MOST IMPORTANT!!! BE AWARE OF YOUR SURROUNINGS AND BE READY TO GET TO A PLACE OF SAFETY QUICKLY!!!**

Facebook



http://www.facebook.com/NWSBirmingham

Twitter (@NWSBirmingham)

- When reporting severe weather and/or damage, please include **#alwx #bmxwx**

TWEETS 8,044 | PHOTOS/VIDEOS 4,422 | FOLLOWING 146 | FOLLOWERS 10.4K | FAVORITES 11 | More

Birmingham

NWS Birmingham
@NWSBirmingham

Official Twitter account for the National Weather Service Birmingham Alabama. Details: weather.gov/twitter

Birmingham, Alabama
srh.noaa.gov/bmx
Joined May 2012

Tweet to NWS Birmingham

Tweets | Tweets & replies

NWS Birmingham @NWSBirmingham · 3h
For Monday, scattered shower/storms possible generally along/north of #I20 in the afternoon. Highs upper 70s & low 80s. #alwx

NWS Birmingham @NWSBirmingham · 3h
It will be warmer tonight with lows in the upper 40s & low 50s. Clouds increasing from the NW. #alwx

NWS Birmingham @NWSBirmingham · Jul 23
Seeing lots of these low-hanging non-rotating scud clouds today: RT @deep_nail: @spann wow gordo #alwx #bmxwx

- Please include the following in the report:
  - Time of event &
  - Location….Brief description of weather/damage

The Effective Spotter Report

Key Components of a Spotter Report

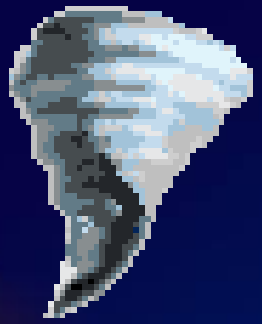
- ✓ Your name
- ✓ Location of spotter
- ✓ Location of hazardous weather
- ✓ Type of hazardous weather
- ✓ Time of hazardous weather
- ✓ Duration of hazardous weather
- ✓ Contact information

The Effective Spotter Report

- Keep it brief
- Identify yourself as a NWS trained storm spotter
- Tell us ***WHO***, ***WHAT***, ***WHEN***, AND ***WHERE***
- Example:

MY NAME IS STORM MAN AND I AM A TRAINED STORM SPOTTER IN CALERA , ALABAMA, LOCATED IN SOUTHERN SHELBY COUNTY. AT 500 PM, I SPOTTED A TORNADO ON THE GROUND JUST SOUTH OF COUNTY ROAD 87, THAT JUST CROSSED INTERSTATE 65. NUMEROUS CARS HAVE BEEN DAMAGED, ALONG WITH POWERLINES AND NUMEROUS TREES DOWN, NEAR THIS COUNTY ROAD. MY GPS COORDINATES ARE…AND I CAN BE REACHED AT 555-5555.

The Effective Spotter Report



Do not assume that if a warning is issued, the NWS knows for certain that severe weather has occurred. (we want to hear from you!)

Never assume your report is not important.

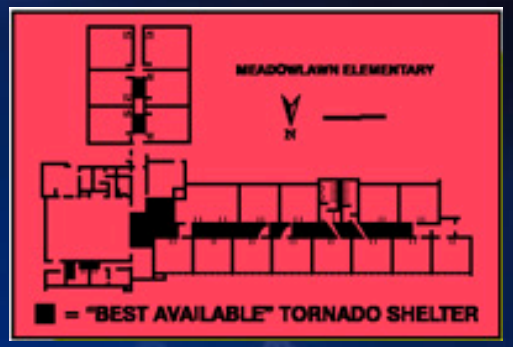
Do not exaggerate your report!

ACES

- Awareness
- Communication
- **Escape Route**
- Shelter

ACES

- Awareness
- Communication
- Escape Route
- **Shelter**



Spotter Safety

The safety of you and those around you is more important than any storm report or storm photo!

- **Personal safety is the primary objective of every spotter.**
- **ACES**
- **Spot WITH someone**
- **Obey federal, state, and local laws and directives from public safety officials.**
- **NEVER take shelter under a highway overpass**

Lightning Safety

- Remain indoors and away from windows and electrical appliances
- If driving, the safest place is to be is to remain inside your vehicle
  - Don't park along fence lines, or near overhead electric/phone lines
- Avoid being the tallest object, stay away from other tall objects such as isolated trees.
- If you can hear thunder, you are in danger of being struck by lightning. Take shelter.
- WHEN IT ROARS, GO INDOORS!

http://tadd.weather.gov

Don’t become another flood death statistic

Story County, IA

Flood Safety

- **NEVER CROSS WATER OF UNKNOWN DEPTH!**

unless absolutely sure the water depth is very shallow, the water is not moving, and the roadway is still intact…turn around and find an alternate route.

- **Water-filled roadways are difficult to see at night. Slow down! At BEST you may hydroplane.**
- **Two feet of running water can pick up and carry most vehicles (including trucks and SUVs).**
- **Never underestimate the incredible power and force of fast moving water.**
- **If water levels are up to a bridge, do not cross it as it may be damaged and unable to support the weight of your vehicle.**

Flood Safety

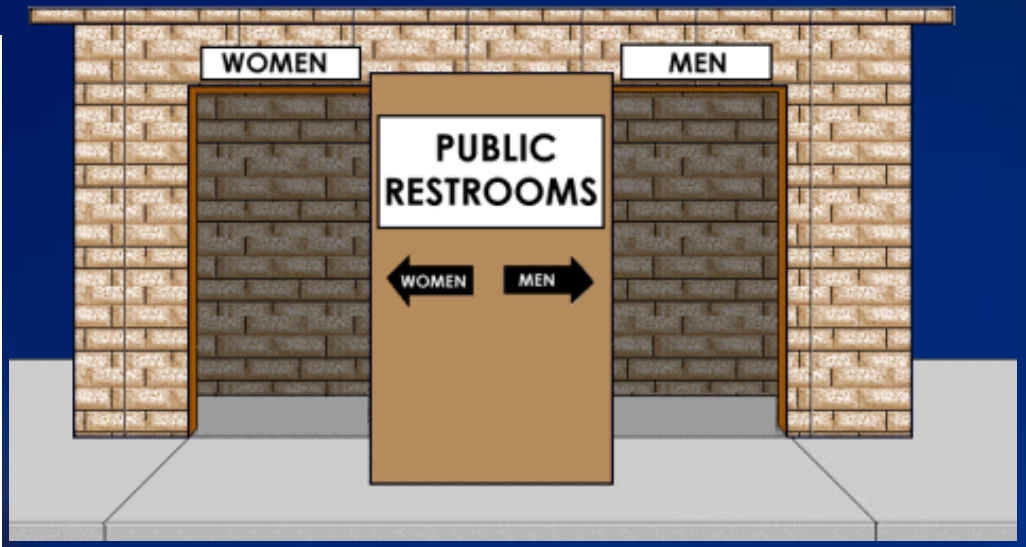
It may just be a whole lot deeper than what you think!

Remember…boats float, cars don't.

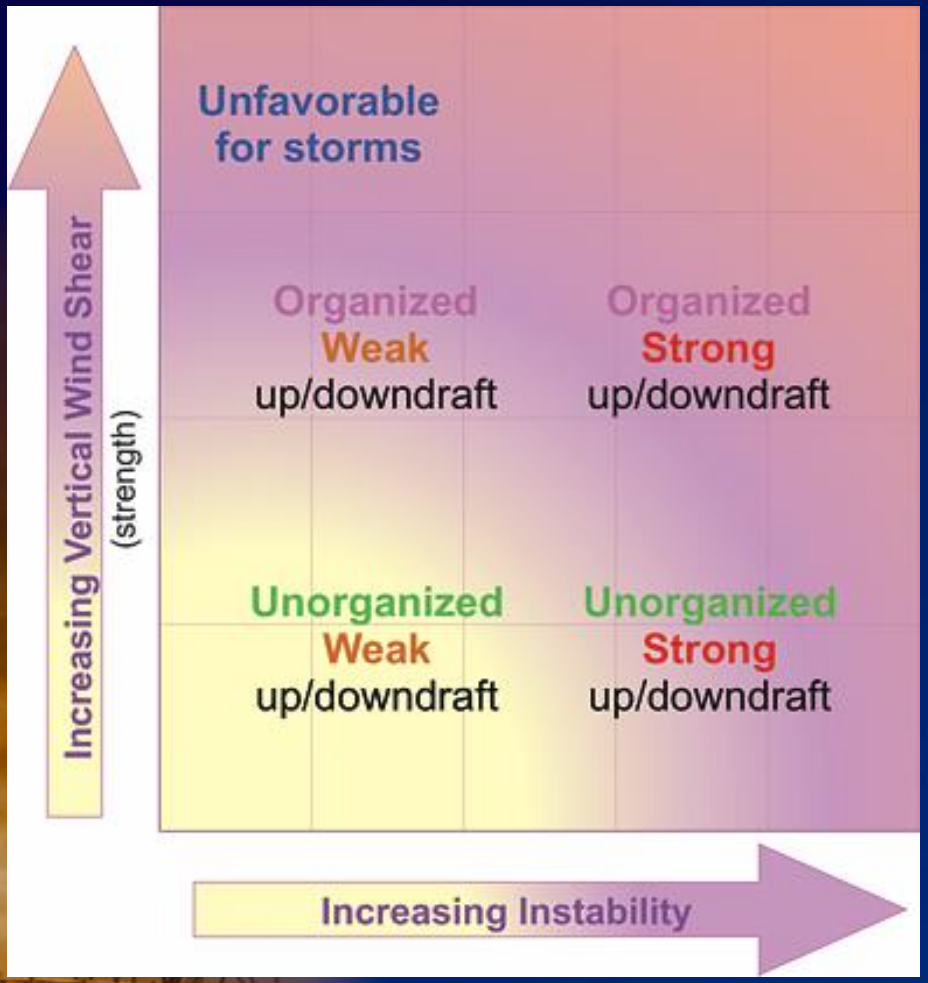
Break Time!

Grab a snack or take a break.

Meet back here in 10 minutes!



Ingredients for Thunderstorm Formation

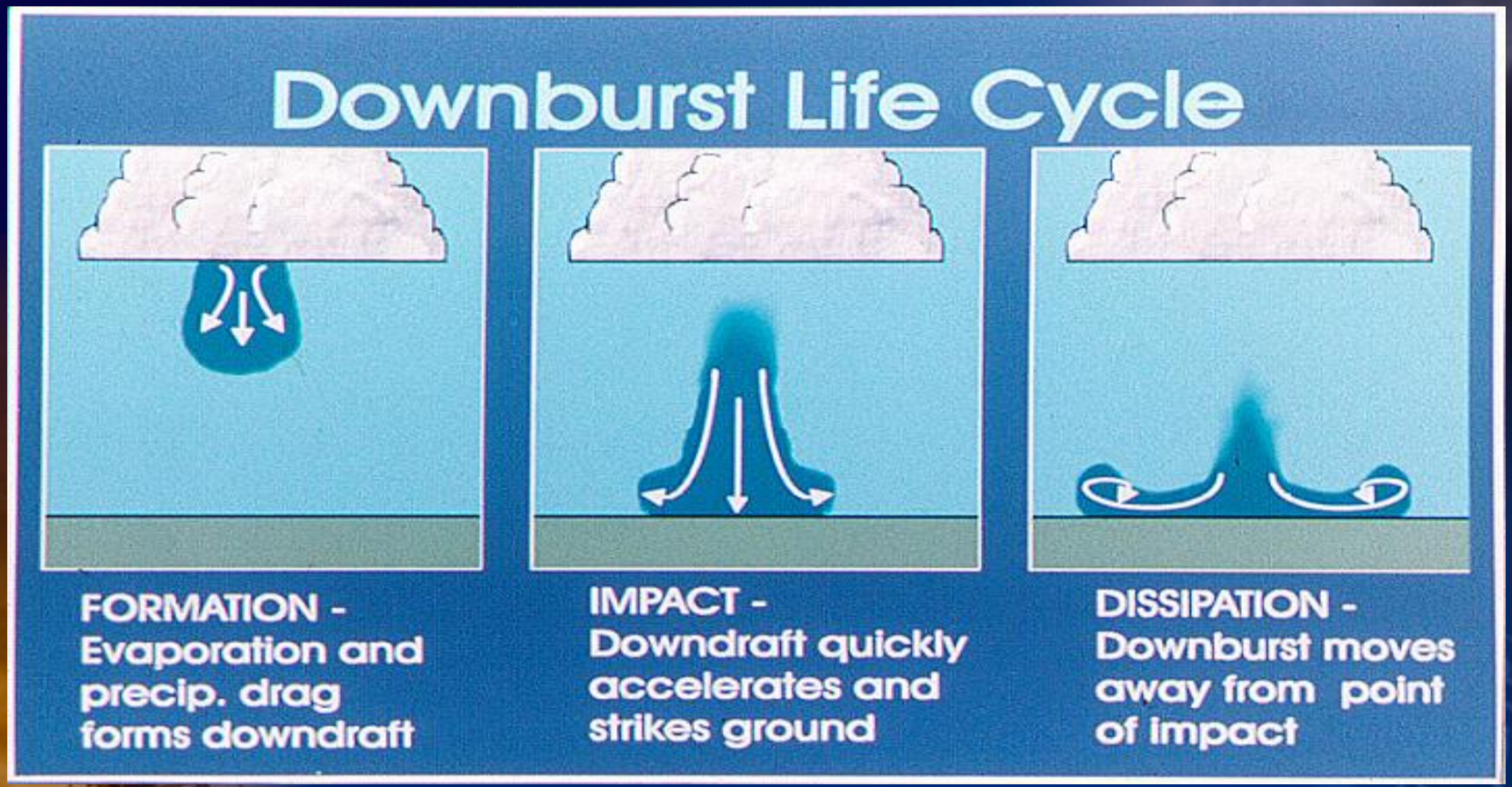


- Lift
  - Cold front
  - Warm front
  - Gust front / outflow boundary
  - Terrain (upslope flow)
  - Warm air rising
- Low Level Moisture
- Instability

Thunderstorm Types

- **Multicell** - ordinary storms with low severe threat
- **Squall line** - line of storms with moderate wind threat
- **Supercell** - rotating updraft with high severe threat
- **Mini Supercell** - small storm with rotating updraft, low wind/hail threat
- **HP (high precipitation) Supercell** - rotating updraft often times obscured by heavy rain, high severe threat

DOWNBURST



A DOWNBURST IS A STRONG DOWNDRAFT WITH AN OUTFLOW OF HIGH WIND SPEEDS CAUSING DAMAGE ON OR NEAR THE GROUND.

Downburst Animation

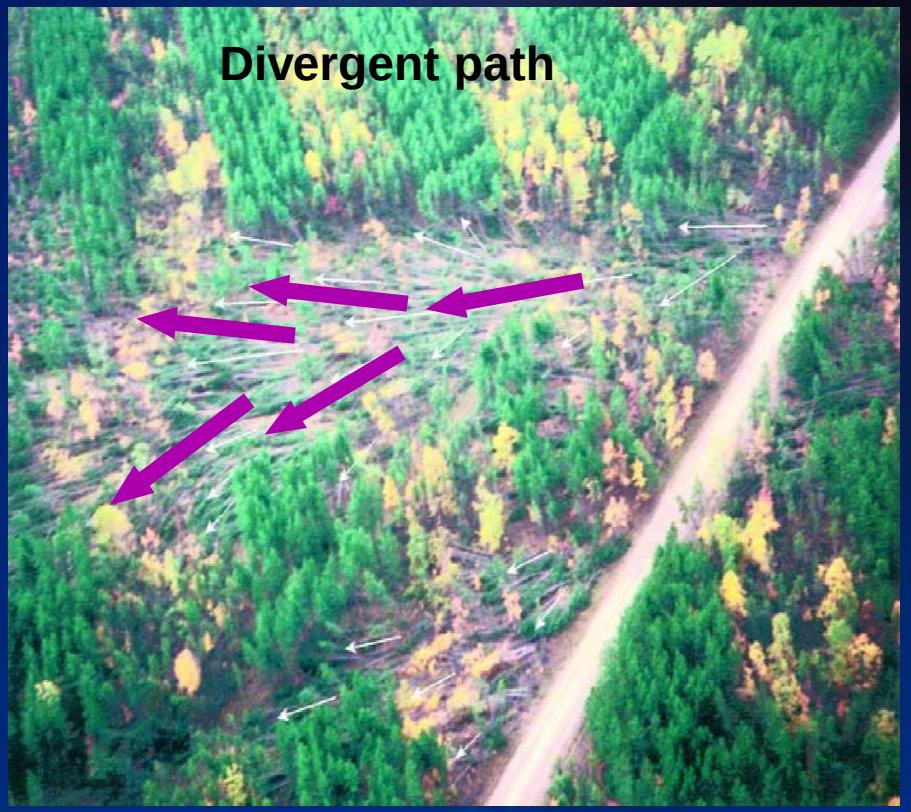
DAMAGE PATHS

Tornado

- Convergence
- Narrow, well-defined track
- Rotation about a vertical axis

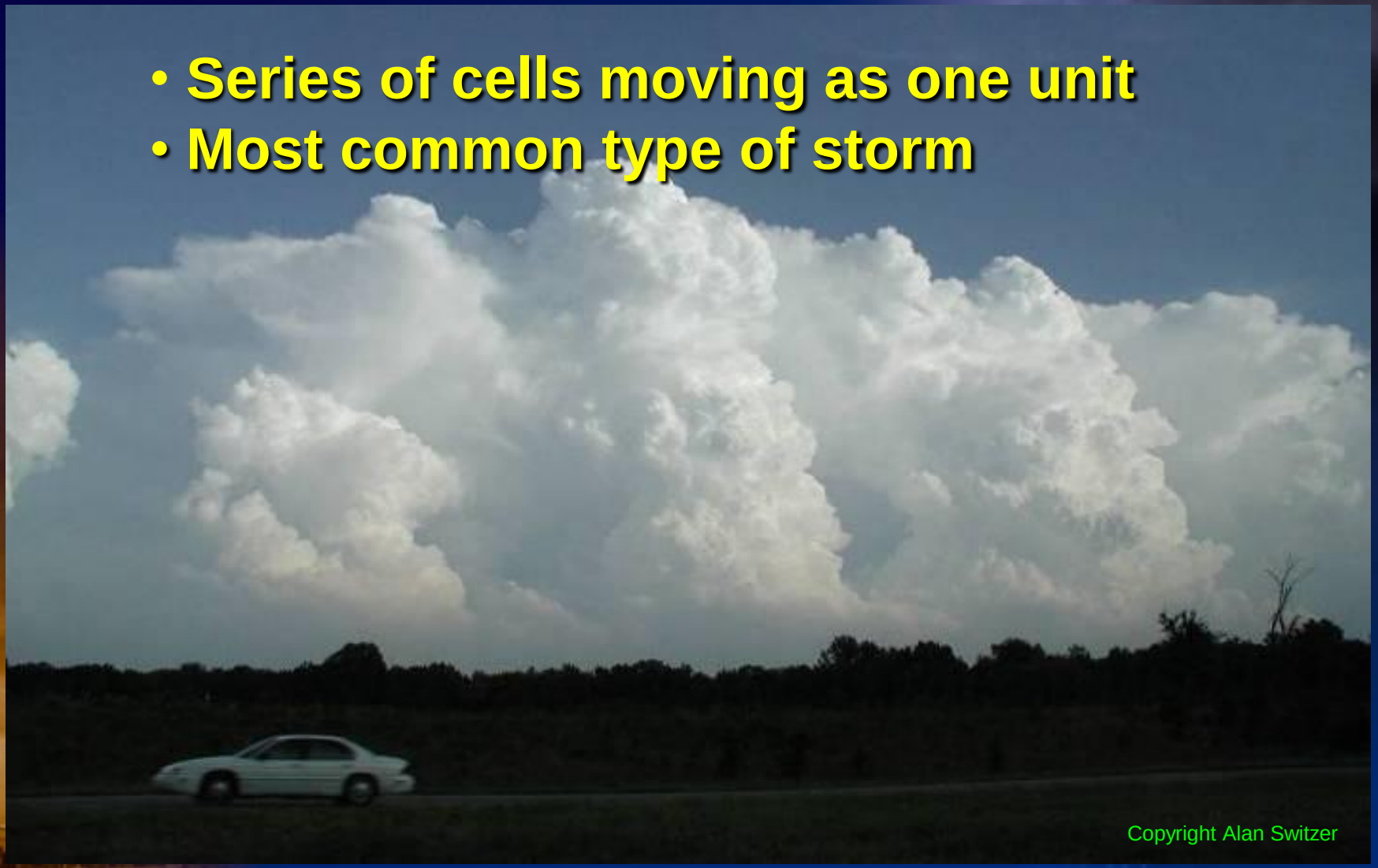
Downburst

- Divergence
- Broad, diffuse track
- No rotation on a horizontal axis



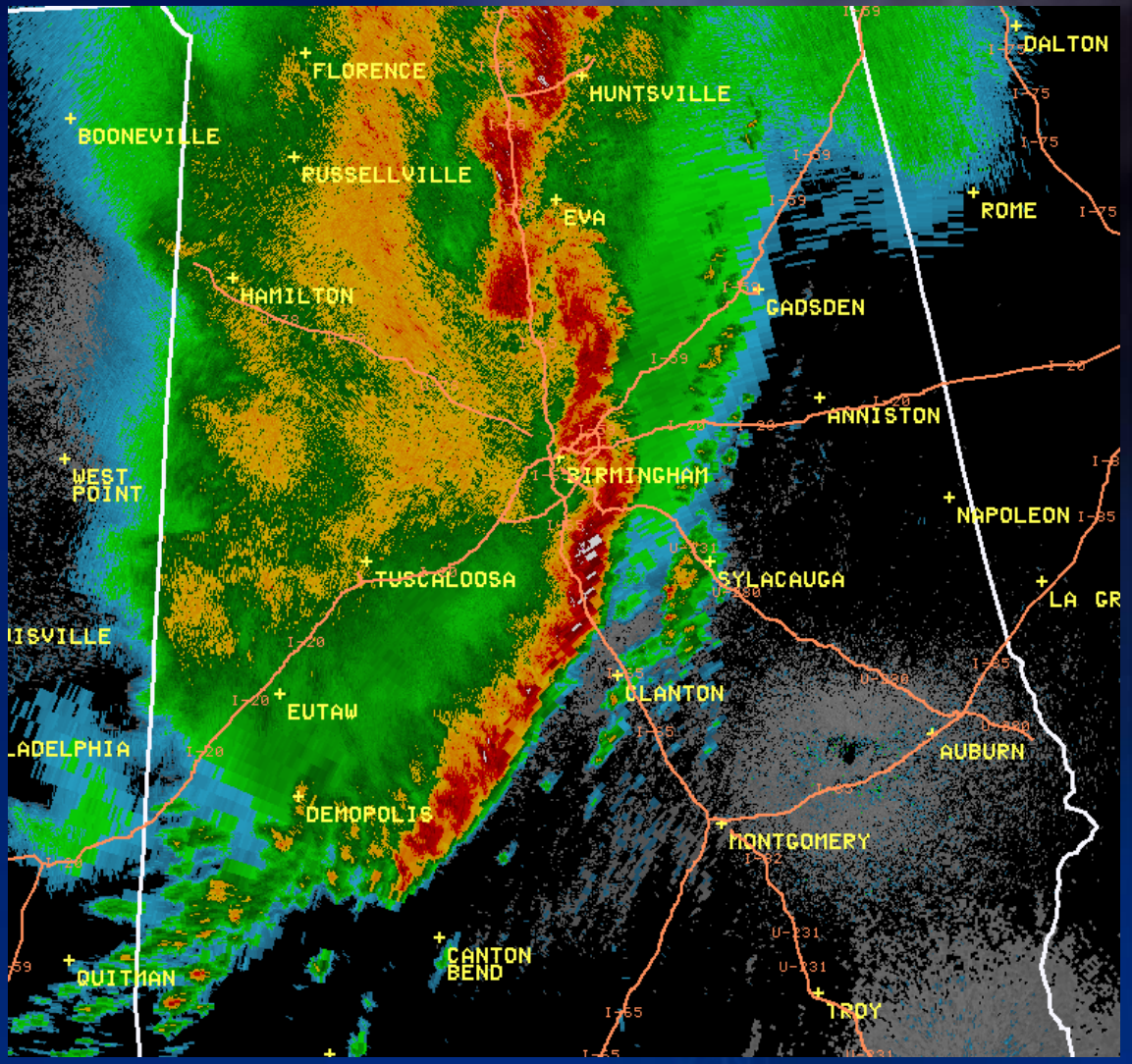
Multicell Thunderstorm

- Series of cells moving as one unit
- Most common type of storm



Multicell Line
(Squall Lines)

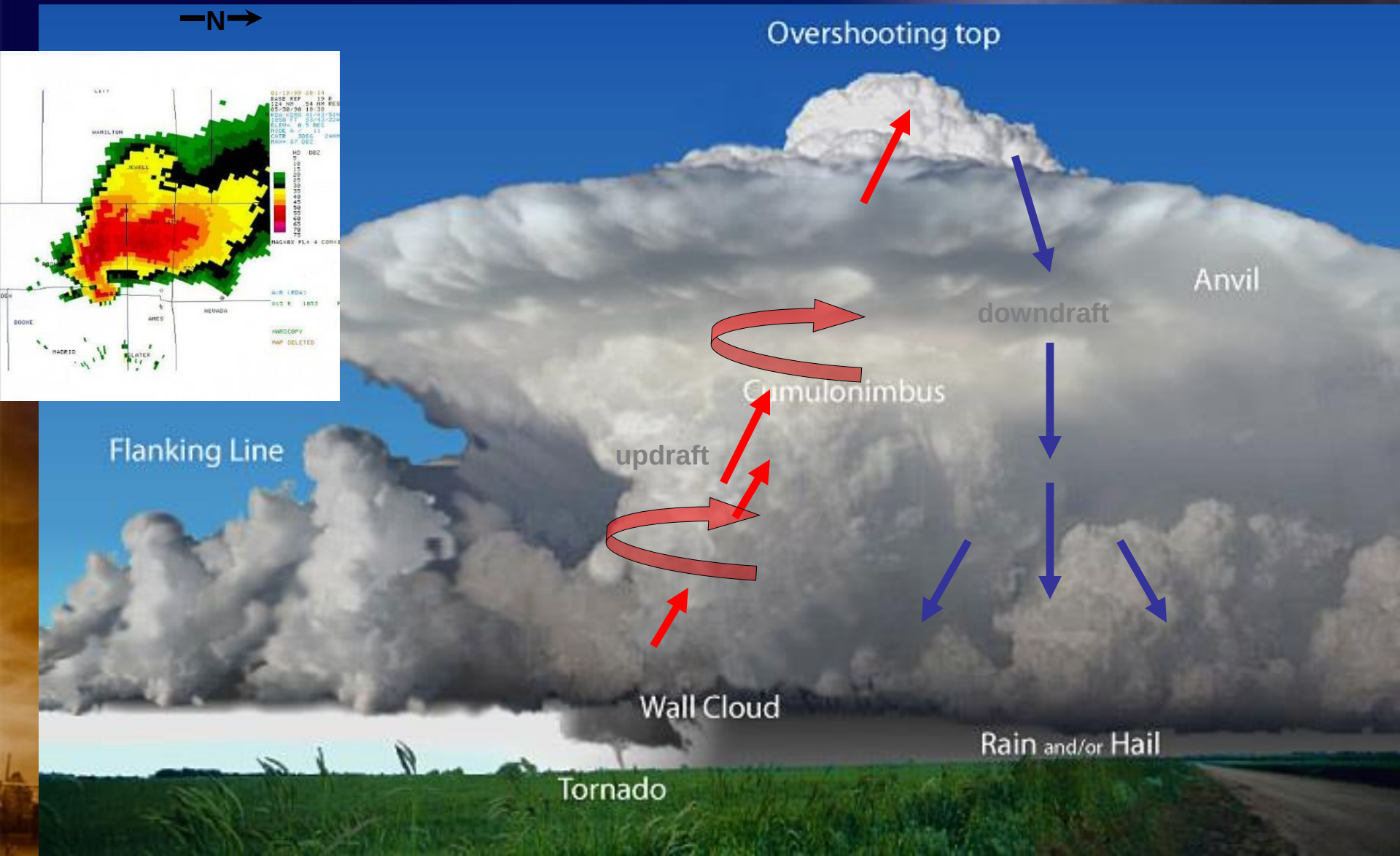
- Long line of storms
- Gust front at the leading edge
- The “Worst is First”



Supercell Thunderstorm

- A thunderstorm with a persistent rotating updraft

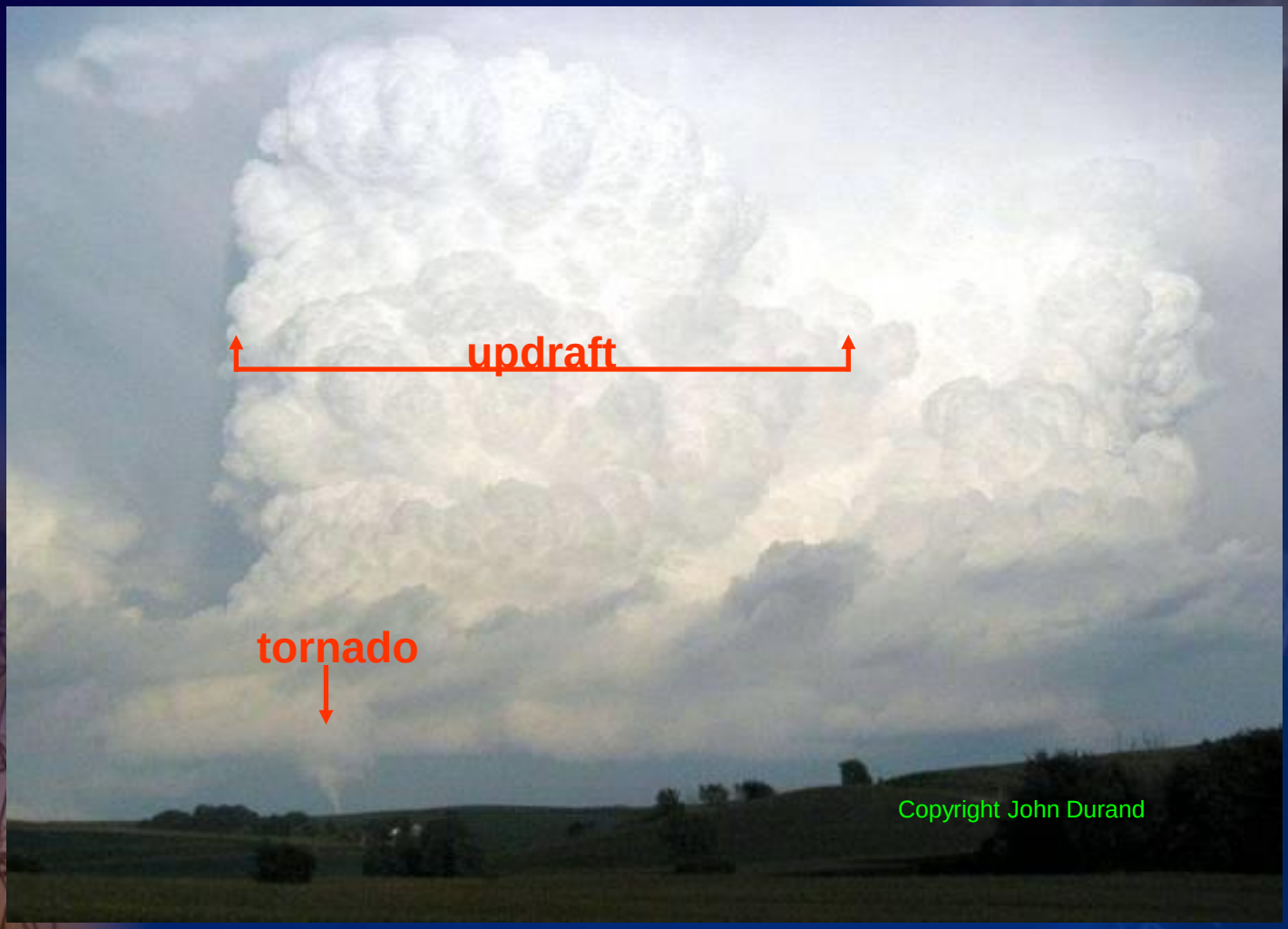
Supercell Thunderstorm



Updraft Characteristics

- "Back" side of storm
- Cumulus tower
- Rainfree base
- Upward cloud motion
- Supercell has rotating updraft

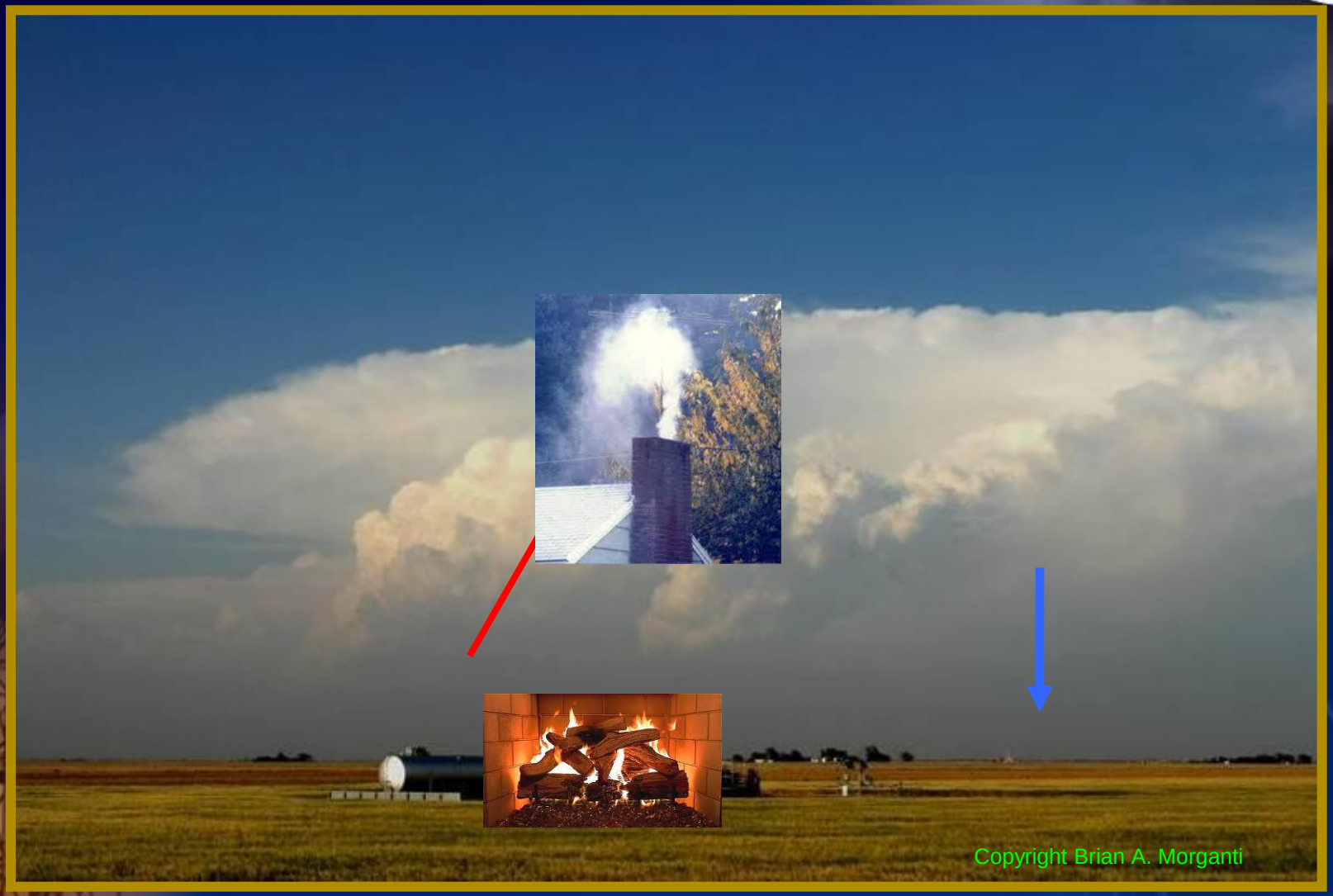
Supercell Thunderstorm



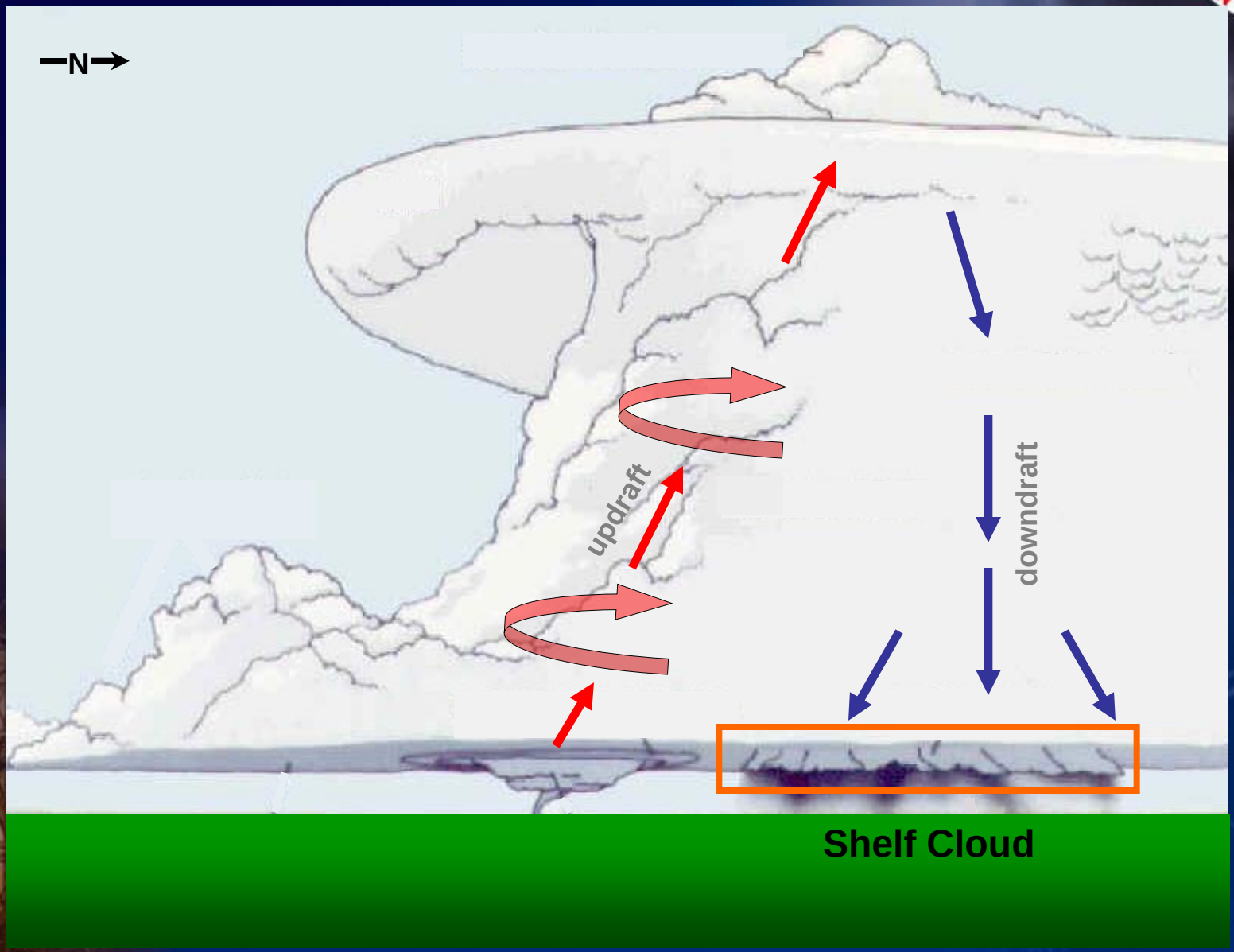
Downdraft Characteristics

- "Front" side of storm
- Dark area of storm
- Rainfall region
- Downward motion
- Downburst/hail threat

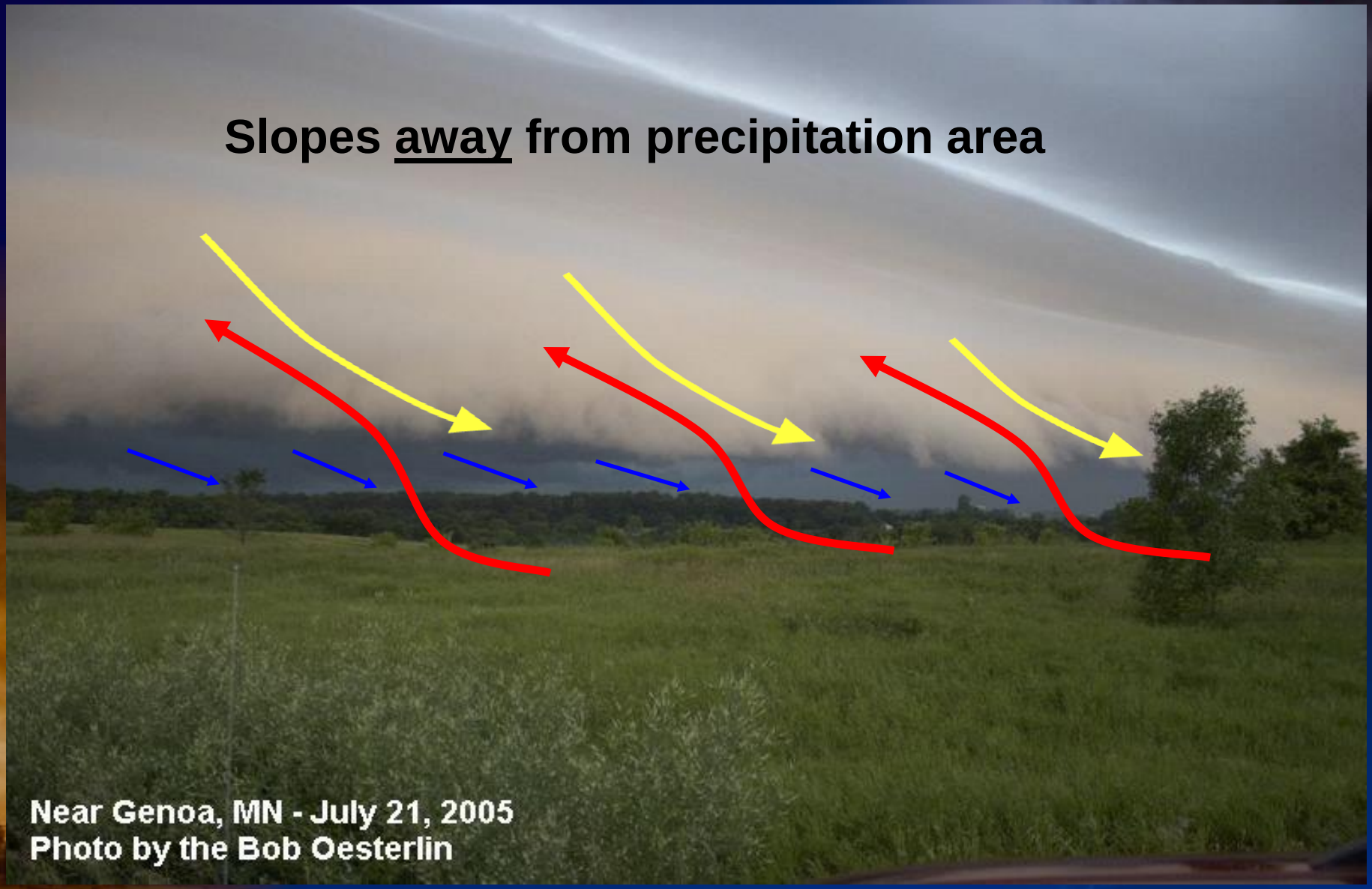
Updraft/Downdraft



Shelf Cloud



Shelf Cloud = Outflow

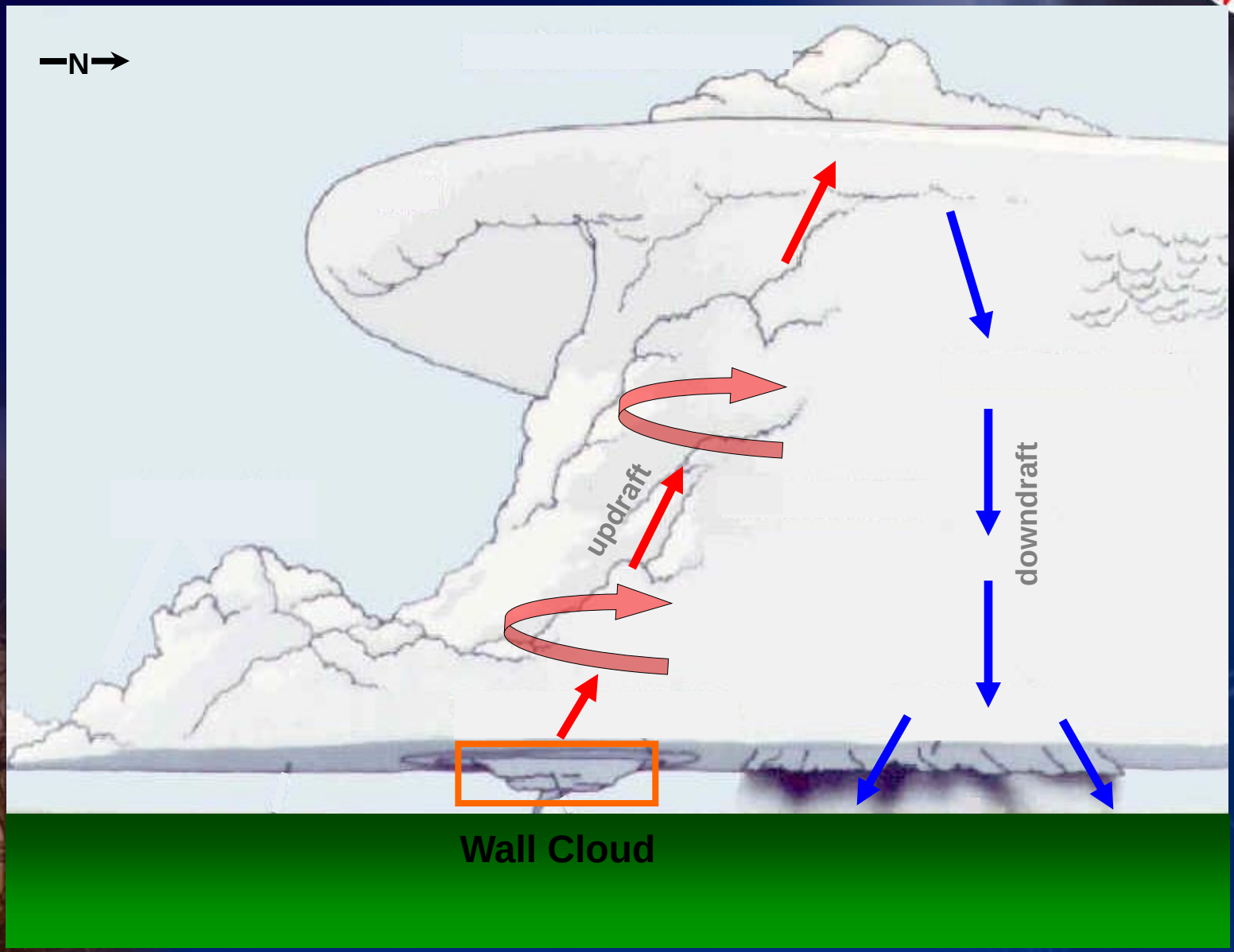


Shelf Cloud

- Marks the leading edge of gust front
- Usually produced by rain cooled air
- Can be found on the FFD or RFD
- Usually in area of low level shear
- Slope down away from precipitation area
- Often associated with a squall line and is typically associated with damaging straight-line wind

Shelf Cloud

Wall Clouds



The Mesocyclone

A storm-scale region of rotation, typically 2-6 miles in diameter.

The circulation of a mesocyclone covers an area much larger than the wall cloud or tornado that may develop within it.

The Wall Cloud

- A localized, persistent lowering of the cloud from the rain free base
- Normally found on the south or southwest (inflow) side of the thunderstorm
- May exhibit rapid upward and downward motion, as well as rotation. However, not all wall clouds rotate.

The Wall Cloud

- Surface based inflow under the updraft
- Attached to cloud base
- Look for persistence
- May or may not rotate
- Look for vertical cloud motion
- Often slopes or points toward precipitation or downdraft

Wall Cloud Development

1a.

1b.

1c.

Wall Clouds


Ron Przybylinski


© 1997 Roger Edwards

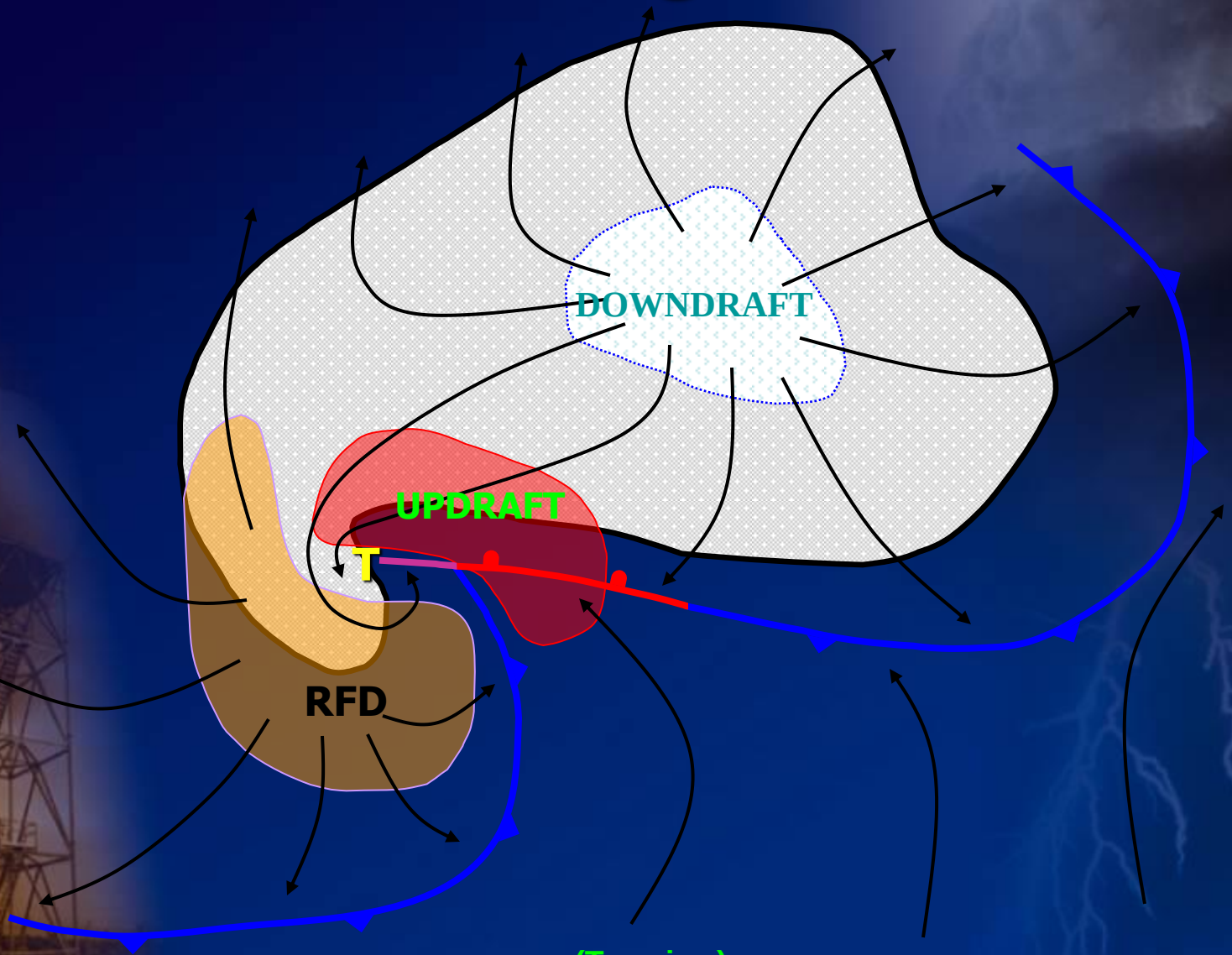

NWS Boise Idaho


© 1999 Scott Blair

Wall Cloud / Shelf Cloud Summary

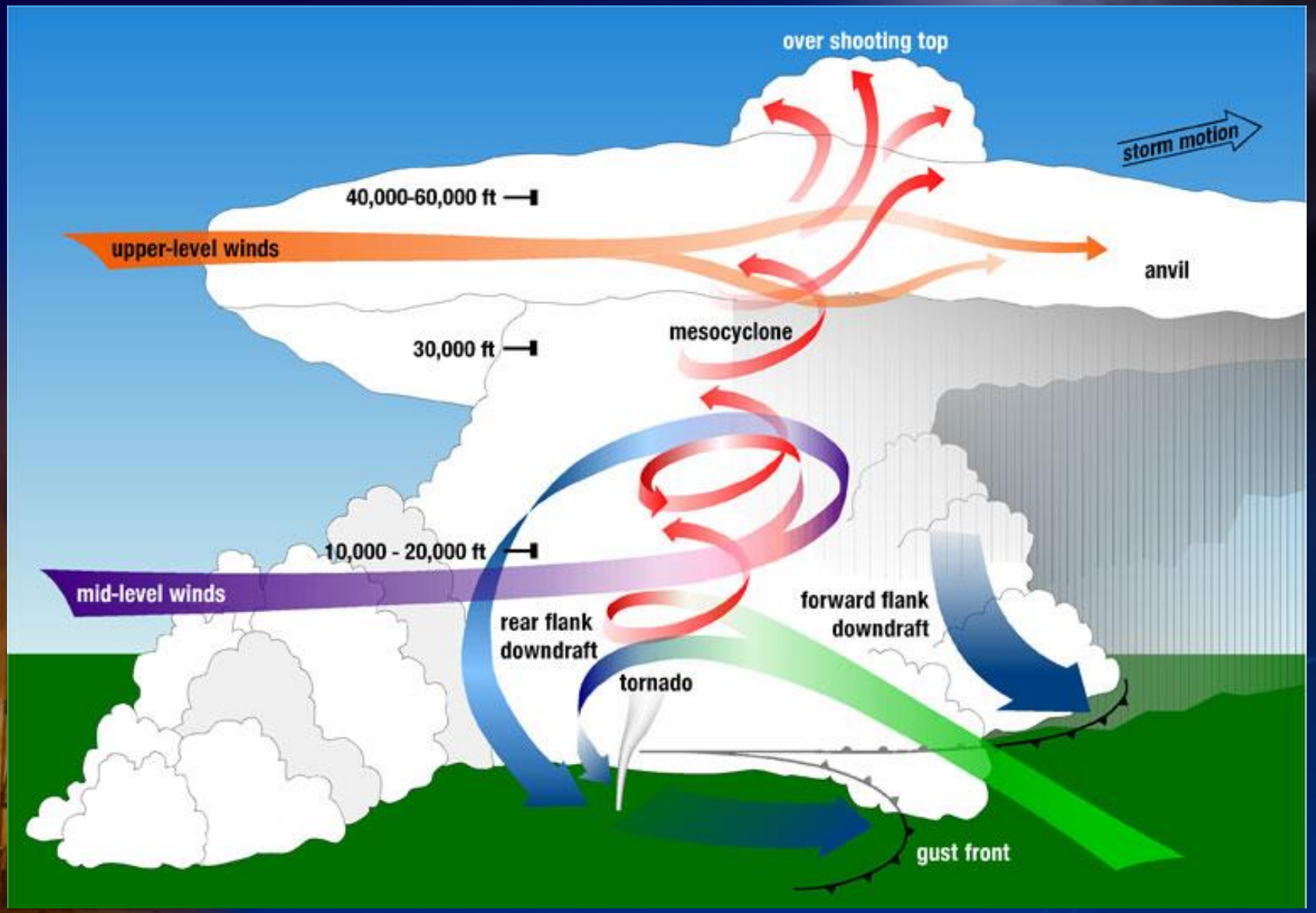
	Wall Cloud	Shelf Cloud
Associated with the updraft	Yes	No
Associated with the downdraft	No	Yes
Often slopes down toward the rain (downdraft)	Yes	No
Slopes down away from the rain (downdraft)	No	Yes
Sometimes associated with gustnadoes	No	Yes
Often associated with funnel clouds	Yes	No
Favored area for rotation	Yes	No

Updraft/Downdraft Tornadogenesis

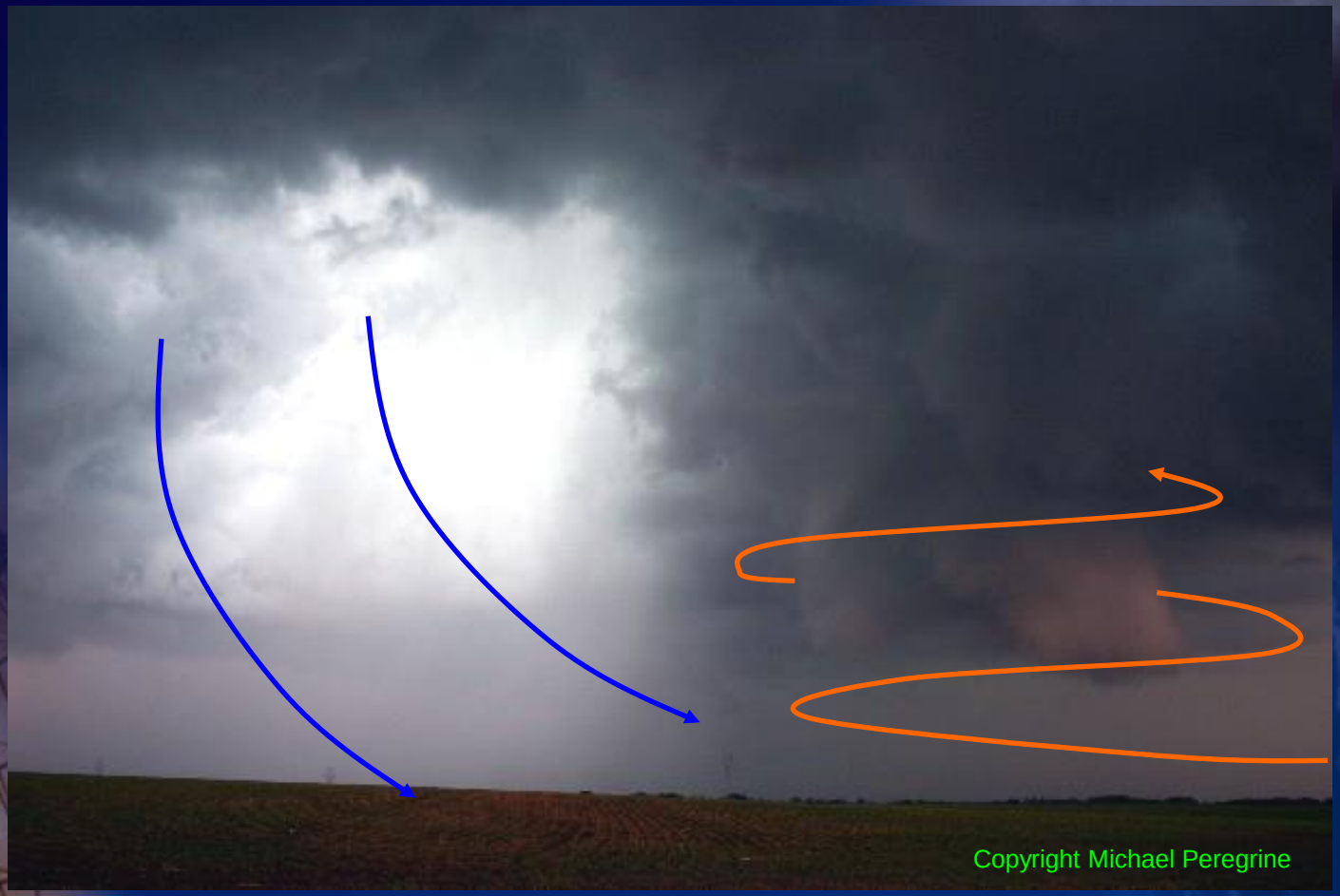


(Top view)

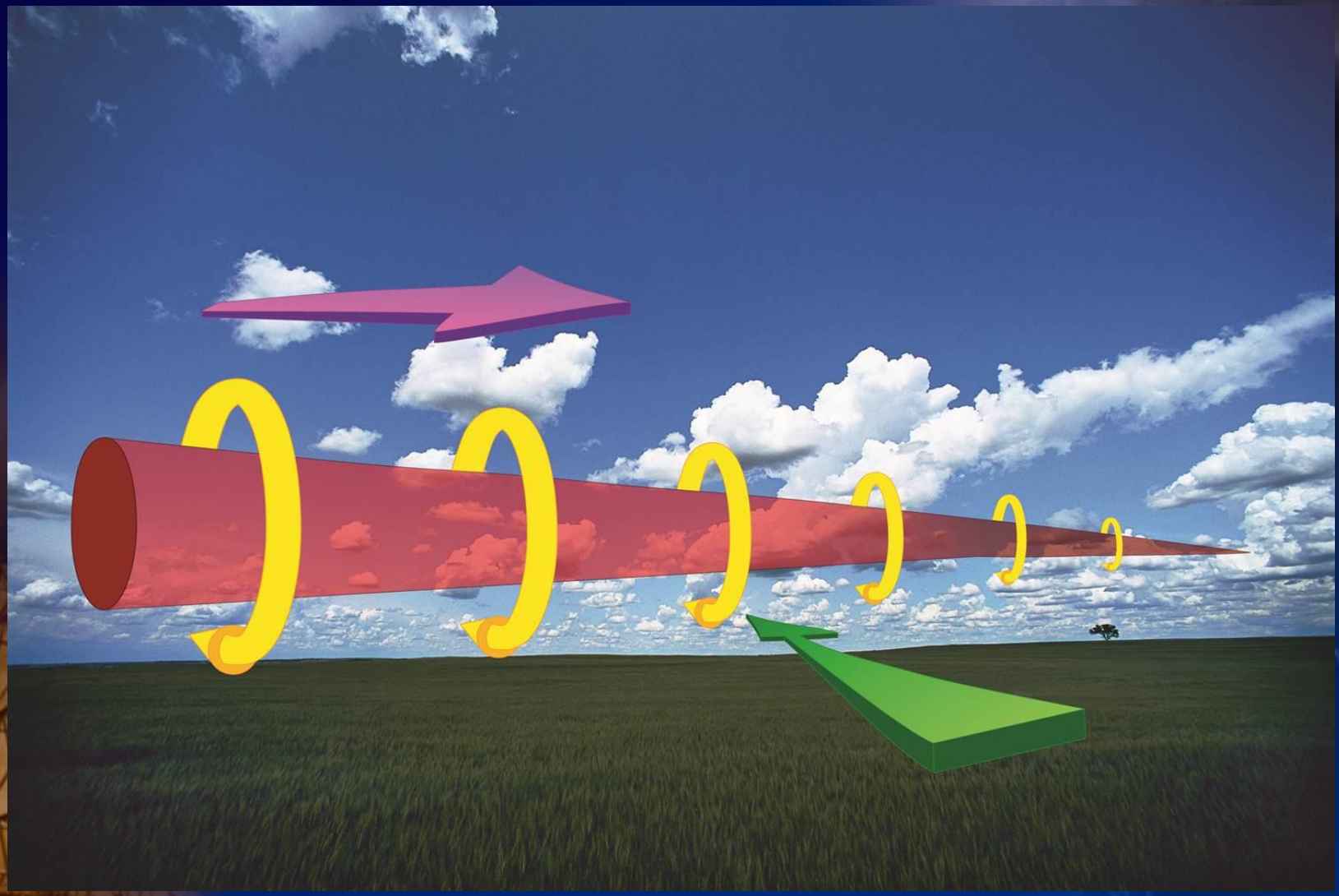
Rear Flank Downdraft



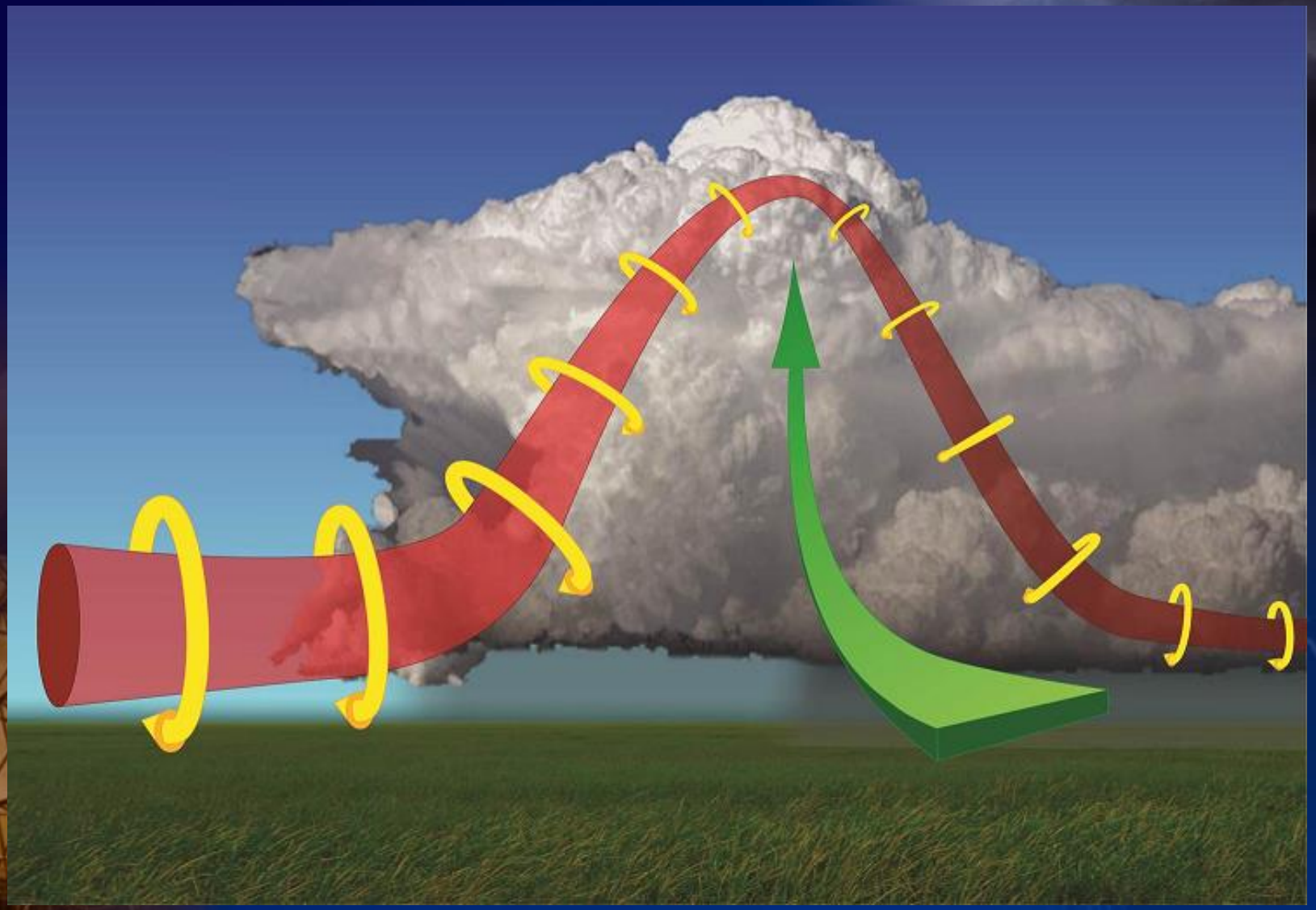
Rear Flank Downdraft



Tornado Formation



Tornado Formation



Tornado Formation

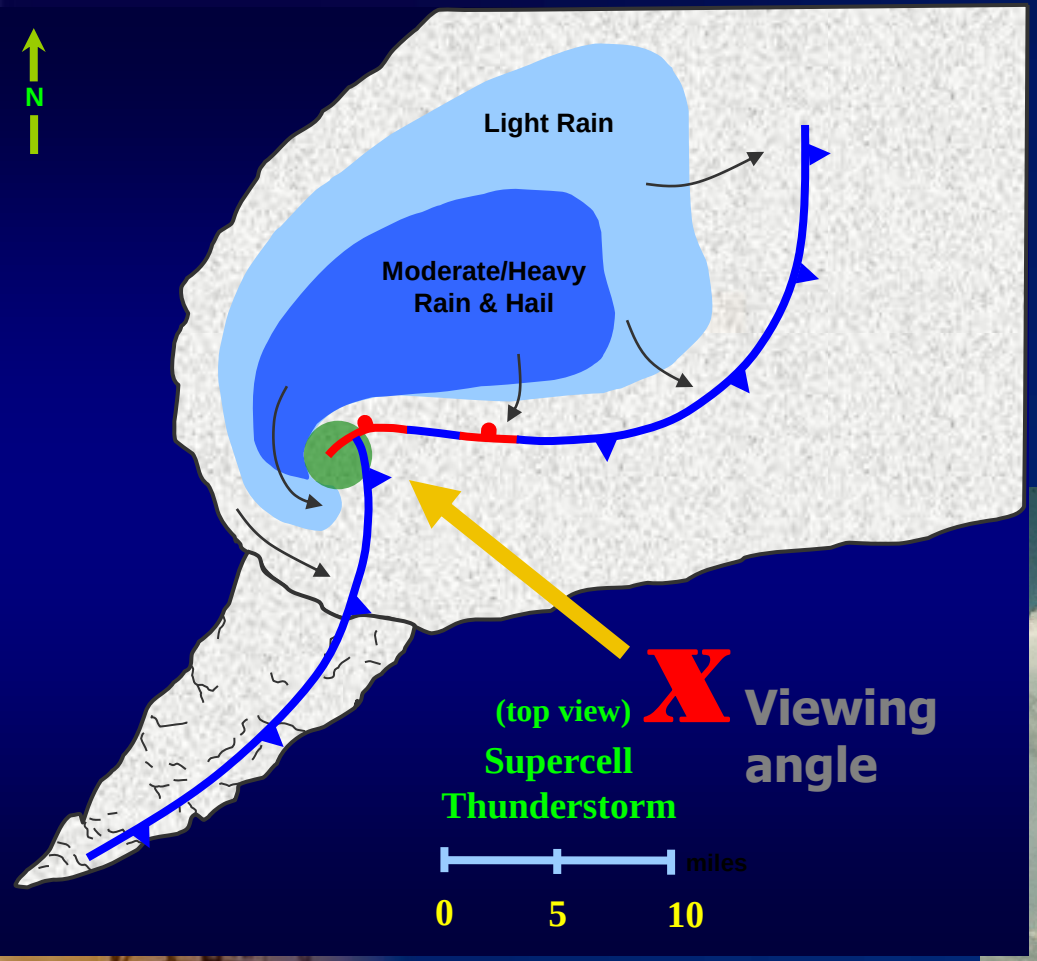
The End Result…

Mesocyclone

Wall Cloud

Tornado

Spotter Location



Upper Level Storm Strength Clues

Mid Level Storm Strength Clues

HP Supercell

HP Supercell

Funnel Clouds

- A rotating, funnel-shaped cloud extending downward from a thunderstorm base.

- Usually located near updraft but can be found anywhere

- Attached to cloud base

- Exhibit rapid rotation and are most often smooth in appearance

- Do ***NOT*** reach ground

Funnel Clouds

Tornado

A violently rotating column of air extending from cloud base to the ground.

Tornado

Enterprise, AL 3/1/07

photo courtesy of J. Barry Mott

Prattville, AL 2/17/08

Cullman, AL 4/27/11

Funnel Cloud or Tornado

Funnel Cloud or Tornado?

Funnel Cloud or Tornado?

Funnel Cloud or Tornado?

Look-a-likes

Look-a-likes

Look-a-likes

FINAL EXAM

When will YOURS be?

- Know the difference between a shelf cloud and a wall cloud
- Know that funnel clouds usually do not form on a shelf cloud
- Know that a low hanging cloud in the shape of a funnel, if not rotating, is NOT a funnel cloud
- Call the NWS!
- STAY CALM! Don't exaggerate
- BE SAFE!

Last Ditch Spotter Safety

- If a tornado approaches…
  - Move away at right angles
  - GET TO SHELTER – the safest place is the basement, if a basement is not available, move to a small interior room away from windows
  - If no escape possible, abandon your vehicle for a sturdy shelter, or lay flat in a dry ravine or ditch away from your vehicle


Please Call in
Your reports!
1-800-856-0758

We want your storm photos!!

SR-BMX.pix@noaa.gov

Name, date, and details!

Do we have your permission to use the photo (with credits)?

We are interested in ALL weather pictures, as well as storm damage photos

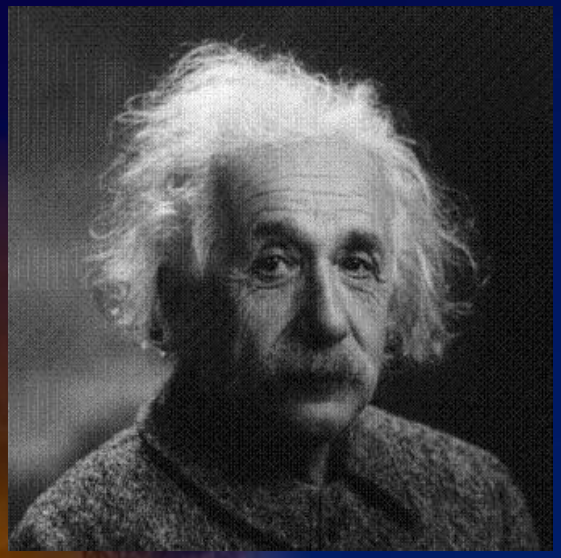
The best photos or videos tend to be those with a wider view of thunderstorm structure, which gives perspective of the phenomenon relative to that of the entire thunderstorm.

See the Spotter Information Sheet for a list of useful links

- Spotter Certificates
- Training Materials
- Schedule
- “Spotter Links”
- Brochures

http://www.srh.noaa.gov/bmx/?n=spottertraining

Still Want to Know More?



- Graduate Storm Spotter Class
- Web based seminar (webinar) getting into the meteorology of severe weather
- 630 PM on Nov 4th, 2014
- Register by e-mail to: *John.DeBlock@noaa.gov*

QUESTIONS, SUGGESTIONS, OR COMMENTS?

Email: Tara.Goggins@noaa.gov

or visit NWS Birmingham's website at:

www.srh.noaa.gov/bmx

Spotters are the eyes and ears of the National Weather Service. Without your help, our job of warning would be very difficult.

We thank you for your participation!

The End

Questions or Comments? Tara.Goggins@noaa.gov